

ACM CHAPTER PROCEEDINGS ON EDUCATIONAL TECHNOLOGY, LANGUAGE & TECHNICAL COMMUNICATION



ISSN:2434-9526



Theme:
Educational
Technology,
Language Studies,
Technical
Communication &
Hot Topics in
Computer Science

VOLUME 2, 2020
ABSTRACTS & POSTERS

THE UNIVERSITY OF AIZU, JAPAN

PUBLISHER: ACM CHAPTER ON E-LEARNING
& TECHNICAL COMMUNICATION



EDITED BY:
DEBOPRIYO ROY

MESSAGE FROM THE EDITOR

The 1st ETLTC2020 international conference was built on the foundation laid with the 1st ACM Chapter Research Seminar on Technical Communication and Information Design (2019).

ETLTC2020 was held at the picturesque *University of Aizu* campus at Aizuwakamatsu city from January 27-31st 2020. This was a highly successful event attended by over 90 participants including delegates from 8-9 different countries from all across the globe, and many other Japanese universities, including members from the German and Japanese industry. The theme of the conference focused on educational technology for language teaching and technical communication, and was reflective of our times and the emerging new trends in the discipline of technology in education. Research by content management experts in the software industry suggests that AI, personalization, analytics, open services platforms and vendor wars will be top trends in technical communication research in 2020 and beyond. The presentations made in this conference by the faculty members and industry professionals from Germany, Mexico, USA, Greece, Ecuador, etc. and other Japanese universities including the master's students from Karlsruhe University of Applied Sciences (HSKA), Germany helped us see the changing tides and the emerging importance of content management and delivery portals. The abstracts and poster publication in this proceeding will help readers with an overall broad analysis, while the full proceedings articles published with the *SHS Web of Conferences* will allow an in-depth analysis of the topics. The central theme of content management and delivery was aptly supported by complementary presentations on AI, virtual reality, technical illustrations, and psychology in technical communication, biomedical engineering and smart cities. Importantly, ETLTC2020 was held in conjunction with Prof. Cohen's ISSM2020 symposium on spatial media, and this collaboration was a great success.

The conference enabled participants to attend presentations on a variety of topics from a wide spectrum in the fields in technical communication, educational technology and applications and language teaching and learning. The interesting feature of the conference was its five-day layout, including a focus on intensive interactions between the different multicultural student and faculty groups over a sustained period of time, multiple workshops spread across the week, student presentations, exhibitions and posters, and importantly informal and formal lunch and dinner meetings to promote intercultural communication and activity.

Heartiest thanks to Prof. Wolfgang Ziegler (HSKA), Prof. Miyazaki, Prof. Cohen, Prof. Abderazek, Prof. Wilson, Prof. Kawaguchi and Prof. Tei from UoA; Prof. Kuroda (JTCA & Osaka University); colleagues at the Center for Language Research namely Prof. Blake, Prof. Younghyon, Prof. Ilic, and Prof. Nicholas; Prof. Yasuta from the Fukushima Medical University; the student groups and volunteers at the University of Aizu and HSKA, and colleagues from the University of Monterrey, Mexico namely Prof. Romero and Prof. Campos. It was an all-round comprehensive effort and we could make it happen through intense collaboration and support. A sincere note of gratitude to all the reviewers, including Prof. Hamada, Prof. Mozgovoy, Prof. Yoshioka, Prof. Pyshkin, and Prof. Vazhenin, from the Univ. of Aizu, and Prof. Neil Johnson from the University of Sunderland, UK for their detailed comments providing scholarly feedback for improvement. We will look forward to carrying on with this initiative and develop a robust partnership for research and teaching collaboration in years to come.

April, 2020

Debopriyo Roy

**Editor-in-Chief, ACM Chapter Proceedings on Educational Technology, Language
and Technical Communication 2020**

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Abstracts and posters from the 2020 ETLTC2020 International Conference on Educational Technology, Language and Technical Communication

The University of Aizu, Aizuwakamatsu, Fukushima, Japan

Sponsored by:



ACM CHAPTER CONFERENCE
E Learning and Technical Communication



ISSN # 2434-9526

This proceedings published by the ACM Chapter on E Learning and Technical Communication are a scientific journal for primarily technical communication, educational technology, information design and management and CALL-focused genres. However, other related topics and genres are welcome as well (based on editorial decision). This journal will be published annually in June-July as online version and as print on demand.

ACM Chapter on E Learning and Technical Communication
The University of Aizu, Aizuwakamatsu, Fukushima, 965-8580, Japan.

Group ID: 80944

Client Number: 9977421

Chapter Type: Professional

Chapter Status: Active as of June 15, 2010

Charter Date: June 15, 2010

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The Japanese National Centre for ISSN at the National Diet Library, Japan will maintain the catalog record for this journal.

<https://www.ndl.go.jp/en/data/issn/index.html>



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ABSTRACTS



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Educational Technology,
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Communication - 2020**

INTERDISCIPLINARY PROJECT APPROACH AT THE ANALYSIS OF URBAN HAPPINESS

ANA C. GARCIA-LUNA ROMERO AND ALESSA
FLEISCHER

ABSTRACT

For a project to be successful, a lot of planning and structuration is necessary beforehand to ensure that the resulting content can be used and understood in relation to the project as well as in relation to other areas and future projects. This applies especially to the work in interdisciplinary teams which adds a new dimension of depth and value to the resulting deliverables but at the same time requires even more preliminary work and continuous monitoring of the project's current status. This paper illuminates the process of interdisciplinary team work alongside a real project at the University de Monterrey, UDEM. Connecting the faculties of architecture and medicine as well as integrating participants of the University of Applied Sciences in Karlsruhe, Germany, the project is aiming to get a new view on the connection of urban happiness, architecture and corresponding happiness from the human bodies point of view. The paper shows the necessary steps from initiating the project to organizing teams and communication up to the process of communicating and displaying the acquired knowledge. The final outlook of the paper show the connection to other projects and areas of research and puts a focus on the term of smart cities, explaining its importance in nowadays world as well as the connection with the project and the way the produced content can help to gain a new approach and view on the development of smart cities.

UNIVERSIDAD DE MONTERREY, MEXICO

ANACRISTINA.GARCIALUNA@GMAIL.COM

KARLSRUHE UNIVERSITY OF APPLIED SCIENCES

SOLVING UNIVERSITY COURSE TIMETABLING PROBLEM USING MULTI-DEPTH GENETIC ALGORITHM

ALFIAN AKBAR GOZALI AND SHIGERU
FUJIMURA

ABSTRACT

The University Course Timetabling Problem (UCTP) is a scheduling problem of assigning teaching event in certain time and room by considering the constraints of university stakeholders such as students, lecturers, and departments. The constraints could be hard (encouraged to be satisfied) or soft (better to be fulfilled). This problem becomes complicated for universities which have an immense number of students and lecturers. Moreover, several universities are implementing student sectioning which is a problem of assigning students to classes of a subject while respecting individual student requests along with additional constraints. Such implementation enables students to choose a set of preference classes first then the system will create a timetable depend on their preferences. Subsequently, student sectioning significantly increases the problem complexity. As a result, the number of search spaces grows hugely multiplied by the expansion of students, other variables, and involvement of their constraints. However, current and generic solvers failed to meet scalability requirement for student sectioning UCTP. In this paper, we introduce the Multi-Depth Genetic Algorithm (MDGA) to solve student sectioning UCTP. MDGA uses the multiple stages of GA computation including multi-level mutation and multi-depth constraint consideration. Our research shows that MDGA could produce a feasible timetable for student sectioning problem and get better results than previous works and current UCTP solver. Furthermore, our experiment also shows that MDGA could compete with other UCTP solvers albeit not the best one for the ITC-2007 benchmark dataset.

WASEDA UNIVERSITY, JAPAN & TELKOM UNIVERSITY, INDONESIA

ALFIAN@TASS.TELKOMUNIVERSITY.AC.ID

FUJIMURA@WASEDA.JP

OBJECTIVE EVALUATION OF JAPANESE L2-LEARNERS' PROFICIENCY USING PRINCIPAL COMPONENT ANALYSIS

MASAFUMI ARAI, HAJIME TSUBAKI AND
YOSHINORI SAGISAKA

ABSTRACT

In this paper, aiming at an automatic evaluation of second language (L2) learners' proficiencies, we tried to analyze an English conversation data having 94 statistics and the Common European Framework of Reference (CEFR) scores of each participant, using machine learning methods. The CEFR defines Range, Accuracy, Fluency, Interaction and Coherence as 5 subcategories, which constitute the CEFR Global Scale score. The 94 statistics were classified into the 5 subcategories. We used the Principal Component Analysis (PCA), one of unsupervised learning methods, on each subcategory and obtained the participants' principal component scores (PC scores) of 5 subcategories. These PC scores were used as the explanatory variables in the evaluation process following. Then, we predicted the participants' CEFR Global scores using the Multiple Regression Analysis (MRA). Three different evaluation methods were compared in this research (Method 1, 2 and 3). The Method 1 is the MRA using as many original statistics as possible for explanatory variables, and the Method 2 uses 8 selected variables which have stronger correlations to the Common European Framework of Reference (CEFR) scores. And the Method 3 does the PC scores obtained in the above-described PCA process conducted in this research. As the results, higher values of the coefficients of determination (R^2) were shown in cross-validation of the Method 2 and 3. The mean value of the R^2 on the Method 1 was 0.61, and those of Method 2 and 3 were 0.82. The results showed usability of the PCA and PC scores calculated from the CEFR subcategory data for objective evaluation of L2 learners' English proficiencies.

WASEDA UNIVERSITY, JAPAN

M5FM_AR@RURI.WASEDA.JP

HJM.TSUBAKI@GMAIL.COM

SAGISAKA@WASEDA.JP

ASSESSMENT OF TCP MULTI-PATHIZATION METHOD ON IOT DEVICES BY SDN BASED ON WEBQOE

YUKI YOSHIDA AND YOSHIHIRO ITO

ABSTRACT

This paper assesses QoE for a Web service (WebQoE) for the TCP multi-pathization method by SDN by experiments with subjects. The multi-pathization method is one of the QoS controls for IoT networks; it can multi-pathize a TCP connection without any changes of terminals or protocols. The previous work of the authors has evaluated QoS and showed the effectiveness of the method for Web services. However, QoE, which is the quality of user experience, is the most important scale for evaluation when using Web services. In addition, when applying this method to the use of Web services, it is considered necessary to examine a parameter related to the decision of packet branching in this method. This paper determines the optimal value of the parameter by an experiment and assesses QoE of an online map service for the multi-pathization method by an experiment with subjects. In the experiment, the authors treat various environments which differs in the amount of load traffic. The obtained results show that WebQoE for the multi-pathization method is always higher than that without the method. Consequently, the paper confirms that the TCP multi-pathization method by SDN is effective from point of users' view. As our future works, we consider evaluating the method in other Web services such as shopping services and examine the optimal parameter value of the method for each Web service.

NAGOYA INSTITUTE OF TECHNOLOGY, JAPAN

YUKI@EN.NITECH.AC.JP

YOSHI@NITECH.AC.JP

A STUDY ON QOE IMPROVEMENT OF ONLINE GAMES WITH UDP MULTIPATHIZATION BY SDN

SO TAKABAYASHI AND YOSHIHIRO ITO

ABSTRACT

In recent years, the market for online games has been expanding in the world. The market size has exceeded 1000 million dollars and it is expected to reach 1700 million dollars by 2022[2]. Especially attention has been focused on 'e-Sports', which refers to competitions and sports played against computer games and video games. E-Sports competitions are held all over the world, and the competition population including the audience is said to be 350 million. As online games develop, a more comfortable environment for users is desired. In order to consist of such environments, a network with low communication delay and packet loss is required. However, the number of online game services becomes large, the amount of traffic generated by them also increases. This causes congestion over the network and makes high communication delays and many packet losses. This paper studies QoE improvement of Online games by applying the UDP/TCP multi-pathization method by SDN. The method can distribute packets for one stream to multiple paths by controlling the network with software without any new transport layer protocol. The author evaluates QoE for two actual online games using the multi-pathization method by experiments with subjects. The experimental results show the following. The authors show that multi-pathization by SDN is effective for online games. However, to further improve QoE, it is necessary to investigate and examine the packet length threshold that is appropriate for online games when distributing packets to each path.

NAGOYA INSTITUTE OF TECHNOLOGY, JAPAN

TAKABAYASHI@EN.NITECH.AC.JP

YOSHI@NITECH.AC.JP

GRFKIDS: DEVELOPMENT OF A GREEK LANGUAGE TEACHING PLATFORM VIA A LEARNING MANAGEMENT SYSTEM FOR PRIMARY SCHOOL PUPILS WITH RUSSIAN AS A MOTHER TONGUE

ELENI MICHAILIDI, IOANNIS SKORDAS, MARIA PAPATSIMOULI, LAZAROS LAZARIDIS, HERACLES MICHAILIDIS, STAVROULA TAVOULTZIDOU AND GEORGE FRAGULIS

ABSTRACT

This study aims to develop an online Greek language learning platform via a learning management system based on the WordPress platform for primary school pupils with Russian as a mother tongue. The subject was chosen with a view to aid both the communication needs of Russian native speakers in Greece, as well as their smooth integration into society. For the purpose of the current study, we investigated how Greek language is learnt in Russia, how widespread and popular it is, whether it is supported by the Russian educational system, as well as whether Greek language distance learning could be achieved. Moreover, LMS(Learning management system) environments were investigated as well, aiming at selecting the most student/teacher-friendly one. Taking into account that the platform is addressed to children, a presentable and properly developed material was designed, thus making the learning of each module more interesting and comprehensible throughout its short duration. With "GrfKids" platform speakers of other languages have the opportunity to learn Greek in an interactive asynchronous teaching environment with an automatic assessment. Moreover, "GrfKids" can be easily and immediately expanded both to pupils' linguistic, as well as age range. \GrfKids" provides Greek language courses to children with Russian as a mother tongue with interactive modules in which the learners can adapt the learning time by themselves. It is easy to use, functional and easily adapted to the ages it is addressed to. It was developed to create a teaching system by applying different plugins to the selected CMS(Content Management system), aiming to achieve a curriculum in which the pupil is in direct interaction with the educational material.

UNIVERSITY OF WESTERN MACEDONIA, GREECE

ELENMICHAILIDI@GMAIL.COM

JOHNSKRDAS@GMAIL.COM

M.PAPATSIMOULH@KASTORIA.TEIWM.GR

EMPLAZAROS@HOTMAIL.COM

IR4KLIS@GMAIL.COM

TAVOUL@TEIWM.GR

GFRAGULI@TEIWM.GR

SPIKING NEUROCORE FOR 3D-NOC NEUROMORPHIC SYSTEM

MARK IKECHUKWU OGBODO AND ABDERAZEK BEN
ABDALLAH

ABSTRACT

Neuromorphic computing tries to model in hardware the biological brain as an approach to deal with the setbacks of conventional computing machines with Von Neumann architecture. The biological brain is adept at operating in a rapid, real-time, parallel, low power, adaptive and fault-tolerant manner within a volume of 2 liters and neuromorphic computing aims to mimic these qualities. Research progress in this field has brought about neuromorphic systems leveraging the event-driven nature of the third generation of Artificial Neural Network (ANN) which is Spiking Neural Network (SNN) to reduce power consumption by power gating sections of the network not driven by an event at any point in time. However further exploration in this field towards the building of edge application friendly agents and efficient scalable neuromorphic systems with a large number of synapses necessitates the building of small-sized low power neuro cores with efficient neuro coding scheme, lightweight on-chip learning and fault tolerance. We present in this paper the digital implementation of a spiking neuro-core for Three Dimensional Network on Chip (3D-NoC) spiking neural network based neuromorphic system. The neuro core houses 256 leaky integrate and fire (LIF) neurons in a chip area of 0.12 millimeter squared with a power estimate of 493.5018 milliwatts. For performance evaluation, the neuro-core was applied in the classification of the MNIST handwritten digit dataset with a spiking neural network trained off-chip, and it achieved a performance accuracy of 95.15% on inference.

UNIVERSITY OF AIZU, JAPAN

D8211104@U-AIZU.AC.JP

BENAB@U-AIZU.AC.JP

OPTIMIZING DEEP-NEURAL-NETWORK-DRIVEN AUTONOMOUS RACE CAR USING IMAGE SIZE

YAQUB MAHMOUD, YUICHI OKUYAMA, TOMOHIDE FUKUCHI, IORI ANDO AND KOSUKE TANAKA

ABSTRACT

Autonomous driving algorithms give vehicles the capability of sensing their environment and moving safely with little or no human input. Autonomous Driving (AD) scenarios are considered very complex environments as they are highly dynamic containing multiple object classes that move at different speeds in diverse directions. Modern autonomous vehicles combine a variety of sensors and cameras to perceive their surroundings and utilize advanced control systems to interpret the sensory information to identify appropriate navigation paths. These various sensors each have their own advantages and disadvantages. For instance, ultrasonic sensors provide good performance of depth measurement for close obstacles but they lack semantic information and perform poorly for far objects. Camera sensors instead, provide rich color information from which scene semantics can be extracted however, they lack of depth information and rely on scene illumination. Deep learning algorithms are becoming successful beyond object detection. Deep learning can be applied to a self-driving car to recognize objects in front of the vehicle or to judge for itself when any situation arises. But to make these judgements, we need a lot of data as training data. In this work we propose scaling down the image resolution of an autonomous vehicle and measuring the performance difference using pre-determined metrics. We formulated a testing strategy and gave provided evaluated suitable testing metrics for RC driven autonomous vehicles. Our goal is to measure and prove that shrinking image size will result in faster response time and higher speeds. Our model shows improvement in response rate in all the neural models and results in the car having higher speeds.

UNIVERSITY OF AIZU, JAPAN

M5222108@U-AIZU.AC.JP

OKUYAMA@U-AIZU.AC.JP

M5222102@U-AIZU.AC.JP

S1260211@U-AIZU.AC.JP

S1260138@U-AIZU.AC.JP

USING DEEP LEARNING TO CLASSIFY ENGLISH NATIVE PRONUNCIATION LEVEL FROM ACOUSTIC INFORMATION

AOZORA KOBAYASHI AND IAN WILSON

ABSTRACT

The ultimate goal of our research is constructing a system that supports second-language (L2) speakers' study of English pronunciation. This system will visualize feedback about differences between L2 speakers' and native speakers' pronunciation. In this research, we attempt to make a system that is able to rate L2 English speech proficiency on a 4- or 5-point scale. To make this system, we use deep learning for analyzing English pronunciation differences between native and non-native speakers. Deep learning is a type of machine learning that uses deep neural networks. When we use supervised deep learning to train the system, one challenge is deciding what factors cause people to label someone's speech as high or low proficiency. We defined such labels in several ways: words per minute, the number of pauses, the length of pauses, and intelligibility. After that, we compared these results after using deep learning to classify speakers. As a result, labeling by number of pauses showed highest test accuracy: 30.6%. However, labeling by the total length of pauses showed smallest test accuracy: 23.2%. We presume that the waveform of speech differs more in shape from a native speaker's one if the speaker says something with so many pauses. Therefore, it is easy for a machine to recognize which sound files are native speakers' files by labeling the number of pauses. The current results have not such high accuracy, so we are trying other labeling methods and comparing their results to get higher accuracy.

UNIVERSITY OF AIZU, JAPAN

M5221101@U-AIZU.AC.JP

WILSON@U-AIZU.AC.JP

IMPROVING JAPANESE ENGLISH PRONUNCIATION WITH SPEECH RECOGNITION AND FEEDBACK SYSTEM

KANTA IGARASHI AND IAN WILSON

ABSTRACT

For Japanese people, communicating with English speakers from abroad has become common because of internationalization, and there are many people who want to improve their English-speaking skills. However, there are few environments where we can speak English, so Japanese students rarely have a chance to study English pronunciation. Also, teachers don't have enough time to individually teach all students pronunciation. Because of that, computers and smartphones are one good type of tool to solve this problem. Intelligent assistants such as Siri or Alexa use speech recognition, which could be a helpful tool for language learners, especially Japanese L2 English learners, who usually do not have many opportunities to use English outside of the classroom. Although the assistants can recognize speech, they do not advise users about their pronunciation. So, in the current research, we are creating a feedback system that would be helpful for language learners. The feedback system advises users from the point of view of articulation and correctness based on real test results. For example, "Incorrect. Open your mouth more and..." In this research, we are creating a web application with a feedback system to evaluate users' English pronunciation using MDN's Web Speech API. The words and phrases used for this web application are chosen from the "Wolf Story" because of the wide range of phonemes. It is easy for teachers and students to access the system, because the web application will be hosted on the CLR Phonetics Lab's website.

UNIVERSITY OF AIZU, JAPAN

S1240221@U-AIZU.AC.JP

WILSON@U-AIZU.AC.JP

AUTOMATIC RECOGNITION AND PRESERVATION OF THREE AIZU DIALECTS USING DEEP LEARNING

YOHEI TOMITA AND IAN WILSON

ABSTRACT

Recently, speech recognition has been effective not only for standard languages but also for dialects. However, the number of such dialects is still small, and there is no research yet to automatically classify Aizu dialects. The Aizu dialect, is spoken in the Aizu region of Fukushima Prefecture, but because the region is so vast, the dialect is actually found to be somewhat different in each area of Aizu, and the small number of speakers of each area's sub-dialect, makes the dialects endangered. Along with collecting audio data to help preserve the dialects, another goal of this research is to train a computer, using deep learning, to automatically recognize the differences within the Aizu dialect. The computer classifies three different areas and calculates the probability that a given speaker is from one of these areas based on their speech. The features used for learning were Mel-Frequency Cepstrum Coefficient (MFCC) values that consider the characteristics of human speech, and Mel-spectrum excluding the discrete cosine transform (DCT), which is the final process of MFCC. The reason for omitting DCT is because the necessary elements for speech recognition may disappear during that step. In comparing the results of the two feature sets, we found that the learning results using Mel-spectrum were approximately 14% more accurate. In one example, MFCC achieved 45.4% accuracy, and Mel-spectrum achieved 57.8% accuracy with the same settings. Therefore, by using Mel-spectrum as a feature rather than MFCC, the Aizu dialects can be classified more accurately.

UNIVERSITY OF AIZU, JAPAN

M5221149@U-AIZU.AC.JP

WILSON@U-AIZU.AC.JP

OPTIMIZATION AND DESIGN OF A BRAIN-INSPIRED ARCHITECTURE ON FPGA FOR TRAFFIC LIGHT DETECTION

TOMOHide FUKUCHI, ABDErAZEK BEN ABDALLAH,
MARK IKECHUKWU OGBODO, AND YUICHI OKUYAMA

ABSTRACT

Autonomous Driving System has recently become a research trend. Perfect autonomous driving is difficult to achieve due to safety concerns. In order to solve this problem, the information on the surrounding situation obtained from the in-vehicle camera plays a very important role. Traffic light detection is one of the important factors for accident prevention in autonomous driving. Improving recognition accuracy leads to an increase in safety, contributing to the realization of perfect autonomous driving. However, there are temporal restrictions on the judgment of the maneuvering in autonomous driving, and there is power restriction in the in-vehicle environment. The ultimate goal of this research is to build an architecture specialized for traffic light detection, and increase its real-time performance and recognition accuracy. Since we implement neural network in hardware, we proposed appropriate neural network architecture. The classifier of the proposed system in this work is a lightweight type with a total weight less than 10,000. In FPGA implementation, we optimized the neural network with two optimizations. pragma HLS PIPELINE, is used to increase the parallelism and calculation speed of the loops required for multiplication of weight and input values. Normalization is used to make CNN work faster. As a result, it was confirmed that the detection had no false recognition of red light in the test data, but the execution speed was 2.5 fps. In FPGA implementation, the resource consumption of convolutional layer is 5 %. In the future, we optimize execution time per image for detection using more FPGA resources with Spiking Neural Network (SNN).

UNIVERSITY OF AIZU, JAPAN

M5222102@U-AIZU.AC.JP

BENAB@U-AIZU.AC.JP

D8211104@U-AIZU.AC.JP

OKUYAMA@U-AIZU.AC.JP

NARROWCASTING VISUALIZATION USING PARTICLES FOR SPATIAL SOUND CONFERENCING

TSUDA KOKI AND MICHAEL COHEN

ABSTRACT

The goal of this study is to visualize auditory communication filtered with narrowcasting. Narrowcasting is technology in communication applications such as chatspace or conferences, enables media stream filtering. It extends broadcast and multicast systems. For audio communication, source is virtual speaker, and its metaphorical organ is a mouth. A sink is a virtual listener, and its corresponding metaphorical organ is an ear. Narrowcasting has four attributes. They are solo & mute (for sources) and attend & deafen (for sinks). Mute → Can't speak (Cover mouth), Deafen → Can't hear (Cover ears), Solo → Can speak (megaphone), but others are implicitly muted, Attend → Can hear (ear trumpets), but others are implicitly deafened. In this research, communication from source to sink is determined according to these four operations, including "autofocus" determination of multipresent sinks, and visualized using flying particles. Multipresence means having (virtual) presence in multiple places at once. In our application a user designates multiple avatar icons as "self" to realize multipresence. Each source must determine which single sink can hear its sound. That determination is called "autofocus." Simulation is only directions, and orientation is not considered for estimation of loudness. Since loudness falls off with distance, sources are autofocused to the closest sink. Particles are created by Unity's particle system. Soundscapes are compiled according to narrowcasting attributes. By doing so, users can more easily understand narrowcasting communication.

UNIVERSITY OF AIZU, JAPAN

S1240054@U-AIZU.AC.JP

MCOHEN@U-AIZU.AC.JP

AKA-BEKO ENSEMBLE: CULTURAL MULTIMODAL HELICAL COMPUTER MUSIC INSTALLATION

YOSHIKI TOKUMITSU AND MICHAEL COHEN

ABSTRACT

In this study, we made "Aka-beko" ensemble. It comprises an octave of a chromatic scale, arranged in a helix and populated by animated oxen, instances of a regional mascot, who lift their heads and sing when triggered by events from a MIDI keyboard controller. The application installation in the University of Aizu 3D Theater features stereographic display and spatialized sound. We used Unity for development and Blender for creating 3D cattle models. The sound source to sing uses mathematics and sings with the sound of shakuhachi. In this development, gyro operation can be performed using ZIGSIM, a smartphone application. The 3D theater, a facility at the University of Aizu, displays two-dimensional images by displaying two screens. In addition, the eight speakers in the 3D theater are used to hear the singing voices of the cows arranged in a spiral around. By placing the viewpoint of the screen outside the spiral structure and arranging it so that the singing voice can be heard from the center of the spiral structure, you can experience the mysterious feeling that you can hear the sound from the inside even if you are looking from the outside. . Furthermore, by rotating the viewpoint with the smartphone's gyro operation, we developed the system so that sound can be heard from a different direction while moving from the outside, making it even more mysterious.

UNIVERSITY OF AIZU, JAPAN

S1240133@U-AIZU.AC.JP

MCOHEN@U-AIZU.AC.JP

NEXT-GENERATION PROGRAMMING LEARNING PLATFORM: ARCHITECTURE AND CHALLENGES

YUTAKA WATANOBE, CHOWDHURY INTISAR, RUTH CORTEZ, KEITA NAKAMURA AND ALEXANDER VAZHENIN

ABSTRACT

With the rapid development of information technology, programming has become a vital skill. An online judge system can be used as a programming education platform, where the daily activities of users and judges are used to generate useful learning objects (e.g., tasks, solution codes, evaluations). Intelligent software agents can utilize such objects to create an ecosystem. To implement such an ecosystem, a generic architecture that covers the whole lifecycle of data on the platform and the functionalities of an e-learning system should take into account the particularities of the online judge system (OJS). In this paper, an architecture that implements such an ecosystem based on an online judge system is proposed. The aim of the architecture is to realize a programming learning platform ecosystem where data acquisition, reuse, feedback, and research are conducted by people and intelligent software agents. To design the architecture, we first analyzed the distinctive characteristics of an OJS, focusing on the actors and learning objects. The architecture consists of several layers, which are used to obtain learning objects based on a resource-oriented architecture from various perspectives. The effectiveness of the proposed ecosystem is demonstrated through a concrete implementation and initial results of research and development employing the architecture. The results include a set client systems as well as different types of feedback system based on machine learning algorithms. Potential research challenges for programming education are also given.

UNIVERSITY OF AIZU, JAPAN

YUTAKA@U-AIZU.AC.JP
D8211106@U-AIZU.AC.JP
RPATYCR@GMAIL.COM
KEITA-N@U-AIZU.AC.JP
VAZHENIN@U-AIZU.AC.JP

USING ACCESS LOG DATA TO PREDICT FAILURE-PRONE STUDENTS IN MOODLE USING SMALL DATASET

HAMIDULLAH SOKOUT AND TSUYOSHI USAGAWA

ABSTRACT

In this paper, we present failure-prone students prediction using access log data from two small data-sets in the Moodle Learning Management System (LMS). While various advanced machine learning algorithms, especially supervised predictive methods such as logistic regression, decision tree, neural network and so on can be used with very large data-sets, which are often not available in most of the universities' initial research especially in developing countries to predict learners' future outcomes. We examine the use of students' patterns to track failure-prone students so that early interventions could be made to prevent failure or dropouts. Real data were collected through explicit learners' actions, such as completing assignments and taking quizzes from two compulsory blended courses namely Operating System (junior-level) and System Analysis and Design (sophomore-level). Research methods are predominantly quantitative. The proposed models correctly predicted failure-prone students before the end of the first academic month for both courses (88% of the class for junior and 86% of the class for the sophomore), which can be possible to early intervene and provide required support during the semester. The outcome of this study can analyze the learners' behaviors that lead to their success and retention rate. Furthermore, the study results will be used to report and feedback the educational parties to value the quality of teaching and learning, improvement of course materials, and increasing learners' retention rate.

KUMAMOTO UNIVERSITY, JAPAN

SOKOUT@ST.CS.KUMAMOTO-U.AC.JP

TUIE@CS.KUMAMOTO-U.AC.JP

PREDICTING PERSONALITY TRAITS BY STUDENT LEARNING BEHAVIORS ON BLACKBOARD SYSTEMS

YONG ZHENG

ABSTRACT

Personality has been demonstrated as influential factors in technology-enhanced learning. Particularly, the personality information has been demonstrated as influential factors in decision makings, especially in the area of educational learning. For example, Komarraju, et al. identified the impact of personality on the academic achievements in GPA. Zheng, et al. distinguished user roles based on the personality traits in order to further improve the quality of group recommendations. The collection of personality is always a challenge. Human efforts are usually required in the user surveys which is the most common and popular way to collect the personality traits. Predicting personality traits, as a result, becomes one of the research directions. On one hand, the personality traits can be considered as numerical and continuous variables, so that the predictive models can be applied for predictions, in which the performance can be accessed by error-based metrics, such as mean absolute error. On the other hand, these personality traits can be treated as labels in the classification process. However, there are no existing research that compare the performance of these two categories of the methods. In this paper, we made our attempt to predict the students' personality traits from their learning behaviors on the Blackboard system by using both classification and regression models. Our initial experimental results help discover the insights about the data and the effectiveness of the applied models.

ILLINOIS INSTITUTE OF TECHNOLOGY, USA

YZHENG66@IIT.EDU



VENICE. BIG DATA FOR THE FUTURE OF THE PAST

MICHAEL TEWES

ABSTRACT

The State Archives of Venice house the history of the Republic of Venice over a continuous period of 1000 years. The archive documents Venice's rise from a small village on a lagoon to the economic/military domination of the Mediterranean. In over 80 kilometres of file material, this history is represented by manuscripts in Tuscan, Latin and Venetian. It is a huge interlinked information system with more than 10 billion individual pieces of information in diverse types of text (Abbott 2017; Kaplan 2015). Since 2013, the EU-funded flagship project Venice Time Machine at the Universities of Venice and Lausanne has been investigating how a 4D model of Venice and its international interdependencies can be created by combining state-of-the-art technology, big data science and digital humanities through the processes of mass digitization, transcription, text processing and connecting data. The Venice Time Machine for example makes it possible as a variant of a medieval - "Google maps" to experience genesis of the infrastructure of a city and its architecture, especially to understand how everyday life functioned, - "Facebook" to know more about the social interaction of people/ families/institutions in the city, - "Google" based on data such as the records of notaries and banks to understand, how the development of financial markets work throughout Europe (Kaplan 2015). The (interim) results of this project reveal that this project, like it's imitators around the world (Jerusalem, Naples, Paris etc.), represents a profound change for the humanities and historical sciences through the use of advanced digitization methods and artificial intelligence technologies. In addition to classical methods, they enable cultural heritage to be elevated worldwide and scientific findings to be specifically networked.

**UNIVERSITY OF APPLIED SCIENCES KARLSRUHE - TECHNOLOGY AND
ECONOMY, GERMANY**

MICHAEL.TEWES@HS-KARLSRUHE.DE

HOW INTERACTIVE AUDITORY VIDEOS SUPPORT LEARNING

MARTIN SCHOBER

ABSTRACT

How interactive, auditory videos support learning Video interactivity can be achieved either by using tables of contents or indexes to quickly and easily find specific topics without long scrolling, or by including clickable markers that appear in the video at a specific time. When such marker is clicked, the movie is paused and further media or text explaining in detail a specific issue of the scene, or containing basic information for understanding can be displayed. Along with XML, WebVTT is a very simple way to add subtitles to web pages without programming. In addition, it is very easy to integrate different languages via language files, currently supported by most video players and also by Youtube. These media mixes, which may contain additional videos, 3D models, 3D animations, texts or images can greatly facilitate learning and strengthen the motivation to learn through the so-called discovering learning. For didactic reasons, and according to the empirically proven modality principle, text information on images and films should be presented auditory. By doing so, the eye does not have to switch back and forth between text and image information, preventing the visual sense channel from being overloaded. Therefore, the use of the auditory subsystem relieves the visual subsystem, which improves learning performance. For these reasons, it is important to present WebVTT files with TextToSpeech software. The control of the text tracks via JavaScript makes it possible to read these texts with suitable TTS programs.

HOCHSCHULE KARLSRUHE, GERMANY

MARTIN.SCHOBER@HS-KARLSRUHE.DE

DEVELOPING AN ONLINE TEST TO MEASURE WRITING AND SPEAKING SKILLS AUTOMATICALLY

GORDON D BATESON

ABSTRACT

Recent proposals from the Japanese ministry of Education describe major changes in the format of English tests in university entrance exams. In particular, students' written and spoken English will be assessed. There is therefore an urgent need for tools to help teachers and students prepare for these exams. Some commercial tools already exist, but they are generally expensive and inflexible. In this paper, the design and function of an open-source, online test for assessing English ability is introduced. The test features the automatic grading of not only reading and listening, but also speaking and writing. This versatile four-skills test allows the general English ability of large numbers of students to be checked quickly online, thus making it suitable for use in entrance exams and placements tests. The major commercial tests, including TOEFL, TOEIC, IELTS and Eiken, are all available online nowadays and most include speaking and writing sections. However, the use of human assessors means that the fees for taking these tests are high, and furthermore the results only become available a few weeks after the test has been taken. To overcome these issues, a new open-source test is proposed that is based around the Moodle LMS. The test features several new plugins to automatically grade speaking and writing. This paper details the development of the plugins, show samples from the preliminary version of the test, and explains how the reliability of the test will be verified by comparing students' scores with human-ratings and widely used tests such as IELTS, TOEIC and CASEC.

KOCHI UNIVERSITY OF TECHNOLOGY, JAPAN

BATESON.GORDON@KOCHI-TECH.AC.JP

EXTENDING INTELLIGENT CONTENT DELIVERY IN TECHNICAL COMMUNICATION BY SEMANTICS: MICRO DOCUMENTS AND CONTENT SERVICES

WOLFGANG ZIEGLER

ABSTRACT

The delivery of so-called intelligent Information in technical communication (TC) scenarios is driven by topic-based content enriched by semantics from XML-structuring and corresponding metadata. The content is created usually within component content management systems (CCMS). Dynamic access to this content is provided by content delivery portals (CDP) and corresponding interfaces. While these applications allow for faceted search, document navigation and full text search, the underlying concepts and technology can vary considerably. One of the recently discussed concepts is the use of ontology models in TC. They might support content creation processes as well as the efficient use of delivery applications like CDP. Therefore, information architects start to work on models of product structures, meta data sets and information structures as well as interdependencies among each other. Consequently, ontologies supplying the methodology of classes, instances, relations and additional rules, well-known in computer science, has gained now much interest in TC. They are used for example for configuration management of documentation as well as for the improvement of CDP retrieval. We extend these considerations combining topic-based content provisioning, semantics and ontology modelling in a new way. We define the method of so-called microDocs as a use-case driven content provisioning, bridging the gap between single-topic delivery and large-document search. By this, the need for context and content amount should be satisfied in a better way. We show, how the rules for building microDocs can be derived from semantic models on different levels from CMS, CDP and ontologies. By this, new types of content services can support larger digital information services (DIS).

**KARLSRUHE UNIVERSITY OF APPLIED SCIENCES (HSKA) &
COMMUNICATION AND MEDIA MANAGEMENT, GERMANY**

WOLFGANG.ZIEGLER@HS-KARLSRUHE.DE

WEB APPLICATION TO CONVERT ENGLISH INTO HELPFUL CHARACTERS FOR PRONUNCIATION LEARNERS

KEITA NAKATSUKA, AKITSUGU NOGITA AND IAN WILSON

ABSTRACT

The International Phonetic Alphabet (IPA) is difficult to understand and too abstract for language learners, teachers, and educators. For example, the list of phonetic symbols in IPA notation in English-Japanese dictionaries and some pronunciation materials on authorized textbook, especially the list of vowel symbols, contains many surpluses and dialect differences, which is far more than the actual number of phonemes in one dialect. In previous research, this problem was solved by proposing a list of 13 English vowels and 24 consonants that are simply organized. Also, a new phonetic symbol font (called Sound Spelling) is assigned to these phonemes. This Sound Spelling is useful, but it's difficult for teachers to write transcriptions right away, so materials using those symbols are lacking for language learners. Our research is to develop a web application that converts input English into sound spelling quickly and accurately to solve this problem. For that purpose, We have created a website using HTML5 and PHP7. Next, in order to implement the function to convert English into sound spelling on the website, We have created a table assigning Sound Spelling to all English words. Finally, We have registered the table in a database and converted the inputted English into Sound Spelling by manipulating the database with MySQL. When creating correspondence tables for English and sound spelling, syllable and stress information have also been added.

UNIVERSITY OF AIZU, JAPAN

S1240213@U-AIZU.AC.JP

ANOGITA@U-AIZU.AC.JP

WILSON@U-AIZU.AC.JP

SAP LEARNING JOURNEYS - A DOUBLE BRIDGE

SVEN A LEUKERT

ABSTRACT

SAP Learning Journeys are a key element for providing a guiding path and framework for SAP users and implementation professionals to learn and stay current in their SAP product expertise. They also form a double bridge between the worlds of learning and technical documentation. On one hand, the Learning Journeys themselves are stored and maintained in the DITA content management system used for technical documentation, and then rendered both in the SAP Learning Hub and SAP Help Portal. On the other, the Learning Journeys allow the inclusion and referencing of technical documentation content into the learning offering modeled with the journeys. Storing and managing the SAP Learning Journeys in the DITA content management system allows to take advantage of versioning and reuse concepts normally applied to technical documentation content, as well as automated production into different output formats, with rendering specifically adjusted to the respective channel. The Learning Journeys are rendered dynamically into SVG graphics, providing interactive features such as progressive disclosure or filtering. On the other hand certain technical content, for example "What's New" information for software products, has so far been included into Learning Journeys as an additional learning asset, often produced with some duplication based on the corresponding technical documentation. Including the What's New deliverables directly into the Learning Journeys eliminates the need for duplicate efforts and ties the two worlds closer together for the learner. In this paper we will provide an account of how SAP Learning Journeys are managed and rendered, and what their evolving role is in the world of user enablement.

SAP SE, GERMANY

SVEN.LEUKERT@SAP.COM

STATISTICAL REPRESENTATIONS OF A DASHBOARD TO MONITOR EDUCATIONAL VIDEOGAMES IN NATURAL LANGUAGE

NAYETH I. SOLORZANO ALCIVAR, ROBERT LOOR ZAMBRANO, STALYN GONZABAY YAGUAL, AND BORIS VINTIMILLA BURGOS

ABSTRACT

This paper explains how Natural Language (NL) processing by computers, through smart programs as a way of Machine Learning (ML), can represent large sets of quantitative data as written statements. The study recognized the need to improve the implemented web platform using a dashboard in which we collected a set of extensive data to measure assessment factors of using children's educational games. In this case, applying NL is a strategy to give assessments, build, and display more precise written statements to enhance the understanding of children's gaming behavior. We propose the development of a new tool to assess the use of written explanations rather than a statistical representation of feedback information for the comprehension of parents and teachers with a lack of primary level knowledge in statistics. Applying fuzzy logic theory, we present verbatim explanations of children's behavior playing educational videogames as NL interpretation instead of statistical representations. An educational series of digital game applications for mobile devices, identified as MIDI (Spanish acronym of "Interactive Didactic Multimedia for Children") linked to a dashboard in the cloud, is evaluated using the dashboard metrics. MIDI games tested in local primary schools helps to evaluate the results of using the proposed tool. The guiding results allow analyzing the degrees of playability and usability factors obtained from the data produced when children play a MIDI game. The results obtained are presented in a comprehensive guiding evaluation report applying NL for parents and teachers. These guiding evaluations are useful to enhance children's learning understanding related to the school curricula applied to ludic digital games.

ESPOL POLYTECHNIC UNIVERSITY, ESCUELA SUPERIOR POLITÉCNICA DEL LITORAL, ESPOL, ECUADOR

NSOLORZA@ESPOL.EDU.EC

RJLOOR@ESPOL.EDU.EC

STALGONZ@ESPOL.EDU.EC

BORIS.VINTIMILLA@ESPOL.EDU.EC

ASSISTIVE TECHNOLOGY FOR PATIENT WITH CONGENITAL FOOT DEFORMITY

EUGENIA MUÑOZ, HÉCTOR CARVAJAL, BRAULIO DOMÍNGUEZ, AND HIRAM CANTÚ

ABSTRACT

An assistive technology (AT) is any item, equipment or product used to increase, maintain or improve the functional capabilities of people with disabilities. The aim of this study was to design and develop two ATs in order to assist the needs of a male student from Universidad de Monterrey experiencing gait dysfunction and pain due to a congenital foot deformity preventing him from normal performance. These ATs included personalized orthopedic insoles to improve the participant's posture and stability as well as two ankle-foot orthosis (AFO) to reduce the pain he presented. In order to design the orthopedic insoles, it was necessary to scan the participant's feet; this was achieved using the photogrammetry technique. For the design of the AFOs, a software that generates a 3D human model was used. Anthropometric measurements of the lower limbs were taken in order to modify the 3D human model generated and obtain a digital model of the lower limbs. Both devices were manufactured using 3D printing technology. In order to analyze the participant's progress and validate the effectiveness of the ATs, we developed a methodology for movement analysis based on the marker-less motion capture system Kinect 2. The data obtained was imported into MATLAB in order to calculate angles between segments and compare gait before and after using the ATs. Moreover, we were able to demonstrate that the use of orthopedic insoles improved participant's posture based on the correct alignment (180°) of the heel with the ankle. Preliminary results show improvements on participant's posture that could further impact on his gait performance. Therefore, we expect a significant improvement on participant's gait after constant use of both ATs developed.

UNIVERSIDAD DE MONTERREY, MEXICO

EUGENIA.MUNOZ@UDEM.EDU

HECTOR.CARVAJAL@UDEM.EDU

BRAULIO.DOMINGUEZ@UDEM.EDU

HIRAM.CANTU@UDEM.EDU

WEARABLE DEVICE FOR AUTOMATIC DETECTION AND MONITORING OF FREEZING IN PARKINSON'S DISEASE

MICHELLE MILLÁN AND HIRAM CANTÚ

ABSTRACT

Freezing of gait (FOG) in Parkinson's disease (PD) is described as a short-term episode of absence or considerable decrease of movement despite the intention of moving forward. This phenomenon is related to risk of falls and low quality of life for individuals with PD. Freezing has been analyzed through different approaches, including the use of inertial movement units (IMUs), such as accelerometers, as well as motion capture systems, both along with robust algorithms. Still, there is not a standardized methodology to identify nor quantify freezing episodes (FEs). In a previous work from our group, a computerized algorithm was developed to differentiate FEs from normal movement using position data obtained from a motion tracking system. The purpose of this study is to determine if this method is equally effective detecting FEs when using IMUs. Thirty subjects with PD will perform a stepping-in-place task in two different days in order to examine medication effects; first day with regular medication intake, and the second day after a 12 hours medication withdrawal. In each session, two trials of the stepping-in-place task will be performed; first trial of 30 seconds and the second trial of 120 seconds. All trials will be tracked by IMUs and filmed; data from IMUs will be compared to the time occurrence of FEs obtained from the videos. Our expected results include high values of sensitivity and specificity to detect freezing by using IMUs. Results would allow the design of a wearable device able to detect and monitor freezing in real time by the implementation of the proposed methodology. This information would allow clinicians to better understand freezing phenomenon in order to improve patients' care.

UNIVERSIDAD DE MONTERREY, MEXICO

MICHELLE.MILLAN@UDEM.EDU

HIRAM.CANTU@UDEM.EDU

ONLINE VS. FACE-TO-FACE COMMUNICATION: HOW ENGLISH SECOND LANGUAGE LEARNERS CAN BE PERCEIVED AS IMPOLITE BY NATIVE SPEAKERS AND ITS IMPLICATIONS

JOYCE LOK

ABSTRACT

This study compares the online and face-to-face English utterances of a group of Chinese students and British native English speakers, where they had to perform a number of speech functions. The sets of spoken data were compared in terms of the level of directness, mitigating devices and turn-taking behaviour. This study collected data by using online questionnaires (for computer-mediated communication data) and role-plays (for face-to-face interaction data), which allows examination of the turn-taking features and the full interactive discourse. The scenarios are what the subjects are likely to encounter in real life; different combinations of role relationships (+/- social distance and +/- power relations) were incorporated into the scenario design. The role-play data were subsequently analysed with the Cross-cultural Study of Speech Act Realization Patterns (CCSARP) Coding Manual developed by Blum-Kulka and Kasper (1993). In terms of directness levels, overall speaking, the two groups employed similar strategies across the scenarios although some differences have been found in terms of linguistic strategies. However, in terms of mitigation, students tend to under-use internal modifications and rely on external modifications in English, especially when they were communicating in real life. Regarding turn taking behaviour, there are significant differences in terms of the utterance length between the two groups. Therefore, a number of pedagogical implications and suggestions on teaching materials design can be drawn from this study, which includes simulation in classroom, interactive demonstration and pragmatic exercises in learning materials.

UNIVERSITY OF CAMBRIDGE & THE CHINESE UNIVERSITY OF HONG
KONG, HONG KONG

JOYCE@CUHK.EDU.HK

A FAILURE MODE AND EFFECTS ANALYSIS OF PRAGMATIC ERRORS IN LEARNER E-MAILS

ALLAN NICHOLAS

ABSTRACT

E-mailing in the English L2 is an important mode of communication for Japanese learners of computer science in higher education institutions, due to the need to interact with non-native Japanese faculty members. It is also important in future professional communication contexts post-graduation, with the increasing need to participate in global networking environments. A key element of effective e-mail communication relates to pragmatic competence- understanding the relationship between social context and language choices and accordingly adapting one's language in an appropriate manner. Despite this importance, there have been few learner e-mail corpora annotated for pragmatic errors- information would allow for learners' needs to be identified and addressed in the classroom. As part of a larger ongoing study developing online tools for assessing and developing learners' e-mail writing ability, a failure mode and effects analysis was conducted on a learner corpus of e-mails, manually tagged for pragmatic errors. Tagged errors were ascribed a value between 1-5 in terms of severity, detectability and frequency, with most severe errors assigned a score of 5. Weighted priority scores were calculated, allowing for errors to be prioritized in terms of importance. Preliminary results indicate severe errors are associated with failing to address the face needs of the e-mail recipient, violating pragmatic norms, with potential negative consequences in terms of relationship maintenance. Results allow for the creation of a job queue for the software developer, and usefully inform teaching priorities in the language classroom.

UNIVERSITY OF AIZU, JAPAN

ANICH@U-AIZU.AC.JP

XML DATABASES AS A PLATFORM FOR SEMANTIC DATA MIGRATION

CHRISTOPHER GESELE

ABSTRACT

The migration and enrichment of existing data, e.g. during the introduction or replacement of Content Management Systems or for further use in Content Delivery, are common tasks in Technical Communication and entail specific requirements. Different data types, complex data structures, (semantic) metadata and information models need to be processed, mapped and converted. Data relations, such as references and linking mechanisms between objects, have to be preserved or rebuilt during the process. Sometimes, a lack of explicit (semantic) information leads to difficulties meeting the needs of the target systems and user groups. The data often contains implicit information, which can be retrieved, extracted or mapped. Quality and accessibility may vary depending on the data source. The usage of XML databases as a centralized platform to aggregate and transform structured data into different data structures and information models, as well as merging and enriching the data with additional (semantic) information from internal and external sources, can be a rational approach. Having access to all data at the same time grants a top down view to data relations and presents a foundation for further reporting, analyzing, enrichment and processing. This paper mainly focuses on best practice methods, such as analyzing data structures, information models and metadata via content engineering or using mapping and inheritance mechanisms to connect and enrich data within the XML database. It will also demonstrate different possibilities to achieve a higher level of semantic enrichment and automatization by combining these methods with other existing approaches, like content intelligence, linguistic and statistic methods or AI-based semantic classifications.

**KARLSRUHE UNIVERSITY OF APPLIED SCIENCES & ICMS GMBH,
GERMANY**

CHRISTOPHER.GESELE@ICMS.DE

A GENERALIZED REUSE METRICS (GRM) FOR COMPONENT CONTENT MANAGEMENT APPLICATIONS

WOLFGANG ZIEGLER

ABSTRACT

Component content management systems (CCMS) have become a standard toolset in technical communication (TC). They allow for a process-oriented and standardized way of content creation, content aggregation and publishing of deliverables for multiple media. However, in many cases neither accurate quality assurance processes are ensured, nor standard mechanisms for gaining key performance indicators (KPI) for CCMS process quality. In this paper, we revisit and define appropriate KPI for CCMS as a part of content analytics. We introduce a generalized reuse metrics (GRM) for measuring corresponding quantities on different levels. These levels consist of, for example, management perspectives or the level of subject matter experts, i.e. for improving working processes in TC teams. Starting from the key process of content reuse, we consider subsequent processes like variant management, version management and the usage of metadata and classifications. Apart from static data, we also show how dynamic KPI can reveal system and process development in time. Having applied the GRM to company data for more than a decade, we report on how users and TC departments benefit from content analytics approaches in real-life business applications. We show how one can use GRM KPI for improving information quality and process efficiency. We finally give an outlook on correlations with recent scenarios of dynamic content delivery, i.e. stating efficiency of content creation in CCMS versus measuring content relevance defined by content access in delivery systems.

**KARLSRUHE UNIVERSITY OF APPLIED SCIENCES (HKA) &
COMMUNICATION AND MEDIA MANAGEMENT, GERMANY**

WOLFGANG.ZIEGLER@HS-KARLSRUHE.DE

OPTIMIZING PRODUCT AND CONTENT QUALITY BY CONTENT LIFECYCLE MONITORING FROM CMS TO CDP

CHRISTIAN DESCHNER AND WOLFGANG ZIEGLER

ABSTRACT

In order to improve product and process quality in terms of effectiveness and efficiency, technical communication as part of product lifecycle processes should be monitored and assessed. While the efficiency of editorial processes can be monitored by methodologies like statistical reuse-analytics, for content management systems (CMS), the evaluation of effectiveness requires reliable information about user's behavior regarding content access. Effectiveness of information is much more than only counting the number of page calls. It covers qualitative properties like relevance and findability of information. Turning utilization data into value is much more complex. Based on a significant amount of data, user interactions must be analyzed in context of chronological sequences of interactions - the user's journey from questions to answers. If typical and recurring interactions patterns can be identified and understood in context of product usage, the relevance of certain types and areas of information can be assessed as well as findability and expected terminology. By this, the scope, structure of information and terminology can be optimized. By combination of methodologies for qualitative and quantitative analyses of content creation, content delivery and content perception, the entire content lifecycle can be monitored. Since Content Delivery Portals (CDP) are required to automatically follow system configuration and status as well as users' interaction contexts, they need to be integrated as any other system component to make use of basic system infrastructure like session management and system monitoring. Consequently, evaluation of CDP utilization data can also help to get a better understanding of user behavior and to draw conclusions regarding quality and usability of the products itself.

SIEMENS HEALTHCARE, GERMANY

CHRISTIAN.DESCHNER@SIEMENS-HEALTHINEERS.COM

**KARLSRUHE UNIVERSITY OF APPLIED SCIENCES (HKA) & COMMUNICATION AND
MEDIA MANAGEMENT, GERMANY**

WOLFGANG.ZIEGLER@HS-KARLSRUHE.DE

ENHANCED MODEL-BASED ENGINEERING FOR CENTRALLY MANAGED CONFIGURATION MANAGEMENT IN PRODUCT LIFECYCLE MANAGEMENT

CHRISTIAN DESCHNER

ABSTRACT

In times of IoT, increasing individualization, and even shorter development cycles, products and product lifecycle management (PLM) processes and correspondingly content creation processes are changing. There are hardly any more products containing hardware only. Both, hardware and software very often are also no monolithic components, but are assemblies consisting of different subcomponents with independent lifecycles - some of them are off-the-shelf components, some of them are custom made. Component manufacturers know about interfaces and configuration options of their components, but not about other components. In this scenario, it's up to manufacturers of higher-level components or products to integrate, configure, and connect subcomponents. Therefore, complex product assemblies are built bottom-up in a multilevel approach. These Multilevel assemblies might not be sellable products, but platforms for product families or mass customization. These assemblies define large numbers of valid product configurations. To systematically derive valid products from a platform, it's necessary that all relevant engineering information is available in one engineering model leading for all PLM processes. Based on platform models, any valid product can be defined by configuration. This configuration is applied as variant filter to platform models, removes all nonrelevant components and ensures that no engineering information for relevant components get lost. The result is a concrete model instance for the specific product. Specific product models are reliable and distinct key elements for all PLM processes. If only aspects and constraints for different processes can be described, the needed information and data structures can be deduced rule based as specific views of the models. A document structure would be such a specific view for content creation and connects content management and content delivery with engineering platforms.

SIEMENS HEALTHCARE, GERMANY

CHRISTIAN.DESCHNER@SIEMENS-HEALTHINEERS.COM

RESPONDING TO SCIENTIFIC WRITING: THE FIVE-FILTERS APPROACH

JOHN BLAKE

ABSTRACT

Viewing written work through the five filters of accuracy, brevity, clarity, objectivity and formality provides a pragmatic way to respond to scientific writing. This paper describes the theoretical underpinning and practical implementation of using the five-filters approach with undergraduate computer science majors drafting their graduation theses. To write appropriately, it is necessary to adhere to the expected conventions of the target genre in terms of content, form and format as deviations may be considered as errors by the community of practice. A template analysis of the pedagogic literature on scientific writing housed in the resource centre of a research institute in Japan was conducted. This study uncovered three major criteria: accuracy, brevity and clarity; and two minor criteria: objectivity and formality. A learner corpus of computer science graduation theses ($n = 629$) was compiled and annotated using these five categories. By the fiftieth thesis, saturation had been reached. The annotated errors were added to a database, and assigned a weighted priority according to perceived severity, detectability and frequency. This paper describes ways to respond to twenty-two types of errors that were discovered. No tech, low-tech and high-tech ways to apply the five filters approach are detailed. In particular, a tailor-made multimodal online error detection tool that uses the five filters framework is introduced. This tool identifies potential errors, highlights the error and provides feedback to the user on the category of error. Users can then select to reveal textual, audio and video explanations in either English or Japanese. Preliminary feedback on the tool from both learners and teachers is positive.

UNIVERSITY OF AIZU, JAPAN

JBLAKE@U-AIZU.AC.JP

DESIGNING SOFT-CLIL FOCUSED PROJECT-BASED LANGUAGE LEARNING EFL COURSES ON SMART CITIES

DEBOPRIYO ROY

ABSTRACT

The rampant urbanization across the world is forcing city planners to be more innovative and creative in how limited resources and amenities are used. Until now, this has not been a subject for study worldwide in the language curriculum, and more so, not as part of the EFL curriculum. There are multiple computer science application contexts for smart cities related to big data analysis, artificial intelligence, robotics, IoT, deep learning, and direct smart city application projects related to smart parking, smart healthcare, smart real estate planning, smart homes, smart energy, and waste management, etc. Thus, there are plenty of topics that could be used to teach soft CLIL-based project-based language learning courses on smart cities as part of a computer science curriculum. For such courses, students can work on foreign language acquisition as part of projects on the smart city or urban issues that directly impact them; one that they find interesting in the context of societal problems that directly impacts citizens' lifestyles; or an innovative approach that students find interesting as computer science majors. This paper will discuss a few model coursework on smart cities offered as part of foreign language coursework in a computer science university in Japan, and performance outcomes for projects that focuses on students' ability for information comprehension, data analysis, note-taking, summarization, speaking, video design, technical presentations, and poster design, all in English. The paper will also make recommendations on how to make such technical writing/communication courses interesting and engaging for students who see the technology side of a smart city design context but do not necessarily see through the human side of the urban design and usability. This paper is aimed at helping language practitioners offer language courses using a soft-CLIL model that focuses on design thinking, urban planning, language acquisition, and project management all as a package in the pedagogical design, as is often necessary for industrial projects. In other words, the idea is to help language practitioners offer coursework that has societal relevance and transfer skills in-built, and just not focuses on language elements in isolation.

UNIVERSITY OF AIZU, JAPAN

DROY@U-AIZU.AC.JP

PHONETICS AND PRONUNCIATION RESEARCH'S CONNECTION TO AND IMPACT ON INDUSTRY: FOUR PROJECTS FROM ONE PHONETICS LABORATORY

IAN WILSON, YOHEI TOMITA, AOZORA KOBAYASHI,
KANTA IGARASHI, AND KEITA NAKATSUKA

ABSTRACT

Phonetics and pronunciation research can have an impact not only on the type of products that companies choose to create, but also on the company-internal personnel decisions that are made regarding hiring, promotion, and creation of employee teams. Products that help us to communicate with one another, both across languages and dialects, are becoming increasingly popular. In addition, pronunciation research such as Derwing and Munro (2009: The Canadian Modern Language Review) has demonstrated that employees have preferences for certain second-language (L2) accents over others, but that comprehensibility and fluency are the key factors that determine someone's preference of one voice over another. These factors should be kept in mind by employers when hiring, promoting, and creating teams of employees. This paper describes four separate research projects - two at the graduate level and two at the undergraduate level - and elucidates potential effects of phonetics research on the industry. The first project is a study of how well deep learning can recognize and distinguish between three dialects of Japanese. As Japanese society ages, there is an increased need for translation/interpretation equipment that can detect and differentiate between dialects - especially in healthcare contexts. If an elderly person goes to the hospital and speaks in a strong dialect, they may not be understood by doctors. Or, an elderly person may be immobile but could be able to operate a smartphone with their voice to make shopping possible. However, many elderly people live in rural areas where strong dialects are spoken, and their speech is often misunderstood. The second project is a study of how well deep learning can distinguish between native and L2 speech, and the implications that have for pedagogical applications in industry - English pronunciation education for employees. In Japanese companies, employees take English classes to improve their English skills. If their English speech levels can be quickly and easily assessed, they can be streamed more simply into appropriate classes. If employees can speak English without interpreters/translators, companies can use more money to develop products, helping the engineering industry to develop. Both the third and fourth projects are about the development of pedagogical applications to improve English pronunciation. The the third one is about the creation of a webpage that uses MDN's Web Speech API to automatically recognize English speech and give articulatory feedback to users to help them improve their pronunciation. The fourth one is about the creation of a webpage that converts English text into a special phonetic script that helps Japanese English learners to pronounce English more naturally, reducing instances of communication breakdown.

UNIVERSITY OF AIZU, JAPAN

WILSON@U-AIZU.AC.JP, M5221149@U-AIZU.AC.JP, M5221101@U-AIZU.AC.JP, S1240221@U-AIZU.AC.JP,
S1240213@U-AIZU.AC.JP

CROSS-PLATFORM MOBILE CALL ENVIRONMENT FOR PRONUNCIATION TEACHING AND LEARNING

NATALIA BOGACH, ELENA BOITSOVA, ARTEM ZHUIKOV, ANDREI NIKOLAYEVICH KUZNETSOV, ANTON LAMTEV, LURII LEZHENIN, MICHAEL MALTSEV AND EVGENY PYSHKIN

ABSTRACT

Mobile technologies promote computer-assisted language learning (CALL) while mobile applications, being learner-oriented by design, provide a powerful founding to build individual self-paced environments for language study. Mobile CALL (MALL) tools are able to offer new educational contexts and fix, at least, partially, the problems of previous generations of CALL software. Nonetheless, mobile technologies alone are not able to respond to CALL challenges without cooperation and interaction with language theory and pedagogy. To facilitate and formalize this interaction several criteria sets for CALL software has been worked out in recent years. That is why an approach based on using mobile devices is a natural way to transfer the learning process from teaching-centered classroom to a process oriented to both individual learners and groups of learners with better emphasis on supporting individual learning styles, user collaboration and different teaching strategies. Pronunciation teaching technology in one of areas, where the automated speech processing algorithms and corresponding software meet the problems of practical phonology. Computer-assisted prosody teaching (CAPT), a sub-domain of CALL, is a relatively new topic of interest for computer scientists and software developers. Present-day advancement of mobile CAPT is supported by evolutionary processes in the theory of language learning and teaching. This paper explores language--technology relations using a case of StudyIntonation -- a cross-platform multi-functional mobile CALL tool for CAPT based on a digital processing core for speech processing, visualization and estimation developed by the authors. We also address the problems of developing CAPT evaluation frameworks. To define the problematic points of the project and understand the directions for future work, a formal evaluation using a CAPT-specific evaluation criteria set was performed.

ST.-PETERSBURG POLYTECHNIC UNIVERSITY, RUSSIA

BOGACH@KSPT.ICC.SPBSTU.RU, EL-BOITSOVA@YANDEX.RU, ARTEM.ZHUIKOV@MAIL.RU,
ANDREI.KUZNETSOV@JETBRAINS.COM, ANTONLAMTEV@GMAIL.COM, LEZHENIN@KSPT.ICC.SPBSTU.RU,
MIKLE9997@MAIL.RU

UNIVERSITY OF AIZU, JAPAN

PYSHE@U-AIZU.AC.JP

POLYSTORE SYSTEM FOR MANAGING WORKFLOWS OVER HETEROGENEOUS DATA IN ASTRONOMY

MANOJ POUDEL AND SHASHANK SHRESTHA

ABSTRACT

Recently, Polystore Systems have been proposed as a new data integration model to provide integrated access to heterogeneous data stores through a unified single query language. There is a growing interest in the database community to manage large scale unstructured data from multiple heterogeneous data stores. Special attention is garnered to this problem due to growth in the size of data, the speed of increment of data and the emergence of various data types in different scientific data archives. Moreover, astronomy has become a data-intensive science that is producing a large volume of data that is diverse. The rise in the size of data have been generating many domain-specific archives. Various astronomical missions have been producing large scale data archives which are published as remote data repositories. The data type mostly consists of images, unstructured texts and structured data (relations, key-values). A method of managing a local data store and communicating with a remote cloud data store with the help of a web-based query system is demonstrated with query examples from the PTF Time-domain Astronomy project.

UNIVERSITY OF AIZU, JAPAN

D8212102@U-AIZU.AC.JP
D8201104@U-AIZU.AC.JP

“POOL OF TOYS”: MULTIMODAL VISUAL MUSIC RENDERING OF SEQUENCED AND REALTIME CONTROL EVENTS

SATSUKI KAWAHARA AND MICHAEL COHEN

ABSTRACT

The goal of this study is to display music visually to aid recognizing each component, understanding songs instinctively by virtue of information from both ears and eyes. Elements of western music comprise multiple aspects (rhythm, melody, harmony, orchestration, ...). A multitimbral song including those elements was made by DAW (GarageBand and then Ableton Live). Each part imported as a MIDI track into a game engine (Unity) controls (modulates) attributes of scene objects at runtime. A real-time surface grid controller (Launchpad Pro) is used together with the precomposed music so performer can synchronously play the MIDI terminal, with output displayed in real-time.

UNIVERSITY OF AIZU, JAPAN

S1240186@U-AIZU.AC.JP
MCOHEN@U-AIZU.AC.JP

Technical Communication in the Digital Transformation Era

Satoshi Kuroda

Guest Associate Professor, Center for the Study of Co* Design, Osaka University
Chairperson of the Planning Committee of Public Activities of the
Japan Technical Communicators Association (JTCA)

ABSTRACT

In promoting digital transformation, going paperless in information sharing is being promoted. The roles of the documents which have been used heretofore have degenerated into being centered on being records, and the usage of fragmented information (microcontent in chunks) is continuing to increase as a communication tool. However, the comprehension levels of the information users which have been implemented via the expression techniques (technical communication) that are being utilized in documents, are not being validated as to whether or not they are being maintained also in these kinds of new information operations *1. Furthermore, the compatibility of business execution and information confirmation conduct, the actualizing of selecting information which is suitable for sites, the eliminating of the sense of being indispensably engrossed in occupational safety, and doing considering in regard to social ethics will be issues. Continuous texts and hybrid texts are different *2, and there is little empirical research which pertains to cognition in compound texts (microcontent displays conform with this). Because of this, the researching and implementing of communication techniques which contain implementation technologies and expression techniques are being sought.

1 Issues brought about from the operating of chunks of microcontent

Research on the cognition of information users in the hybrid texts (documents) which combine not only sentences of continuous text, but also sentences and charts (documents) is accumulating, the disseminating and implementing of this in industrial objectives and educational objectives is also advancing.

However, there is little research in regard to the cognition of information users in diverse compound texts such as web contents, SNS, and the microcontents that are provided through wearable devices, and they are not being systematized as communication methodologies. It is expected that there will be issues in the implementing aspects in the communications.

2 Strategies for resolving issues

In premising the social needs which are seeking the microcontent that is substituted in the documents, the strategies for resolving issues are visualized as per the following.

- a. Narrow down the provided information by premising the utilizing of literacy and the guiding to referential information which is retained through education and training.
- b. Provide the “Needed information” each time, even in situations whereas the work is mixed.
- c. Match the work, and distinguish the “When needed”, and encourage information cognition so that they are not overlooked.
- d. Present “Just the amount needed”, and do not cover the field of view with information.
- e. Use optical transmission head-mounted displays (hereinbelow HMD) as research materials.
- f. When implementing, enable verifying in light of social ethics.

3 Communication methodologies as strategies

Unlike documents which can be surmised to be operations management that is centered on printed materials, with microcontent, the communication methodologies which include implementation technologies and expression technologies are required.

Display devices can be anticipated to be centered upon wearable devices which include HMD. This means that the redesigning of technical communication from the past is being sought.

I. Present information which draws near people

In considering the differences *2 in working memory capacities (hereinbelow WM) and cognitive biases, present “Just the amount needed”, of information “When needed”.

- Use the nudge theory → inductive information displays so that they prevent hindering of the work, and prevent overlooking.
- Alleviate the information displays which match the WM → recognize the differences in recognition processing by clearly specifying the orders and layouts of the characters and diagrams, and their relevancies.

II. Matching with situations

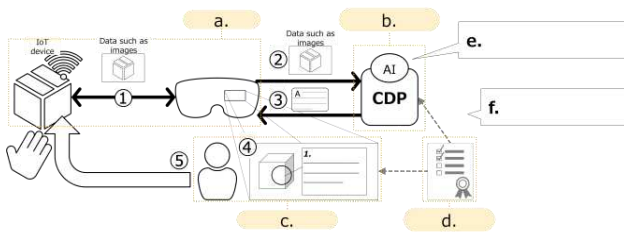
In order to actualize the refining to the appropriate contents, the on-site situations need to be able to be distinguished and be determined.

Apply the mechanisms which extract information that is based upon data acquisition from image recognition, the Internet of Things (hereinbelow IoT) devices. Assume the usage of artificial intelligence (hereinbelow AI).

III. Build a data structure which links data structure statuses and information that enable the associating of the information with the status, and dialogically extract the “Needed information” from the on-site conditions. In relation to the unstructured data which indicates the situations, use the technologies which convert it into semi-structured data.

IV. Enable reviewing in light of inclusion accuracy in the mechanisms which enable evaluating and reviewing, appropriateness, usefulness, timely evaluating, and social ethics.

4 Conceptual illustration of an implemented system (*3, *4)



- a. Matches with the situation
- b. The data structure makes associating the situation and information feasible
- c. The information which is close to a person is presented
- d. Includes mechanisms which enable evaluating and reviewing
- e. **The CDP which links, and manages the semi-structured data**

The data which shows the on-site situations such as the images, and the micro contents which are segmented into chunks are semi-structured and linked within the CDP.

- f. **Evaluating and reviewing mechanisms**
- In order to evaluate the respective validities of the support information, and AI inference results such as the data, and manuals, etc. which discern the on-site situations such as the images, all of these data and models are passed on to the CDP through an approval process.

In conjunction with monitoring and controlling the processes, this mechanism also provides validity verification functions such as foundation displays and history displays for the workers while they are operating the system.

*1 Information operations means to operate the information which is grasped via the perspectives of “Creating, delivering and using”.

*2 REFERENCES (Original Japanese op. cit.)

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*3 These information provision mechanisms were devised by Information System Engineering Inc. They pay attention to the “Delivering” processes in the information operations, and they do not rely on specific databases, and they utilize structuring technologies, and they provide optimal information to workers in the areas of xC (Technical Communication, Risk Communication, Health Communication).

*4 Related to the above conceptual diagram, and it is the information provision system and the information provision methodologies which utilize CDP, AI, XR, and IoT in xC, that are ISE’s unique technologies.

SECTION 2

POSTERS



**ACM Chapter Proceedings on
Educational Technology,
Language & Technical
Communication - 2020**

A Generalized Reuse Metrics (GRM) for Component Content Management Applications

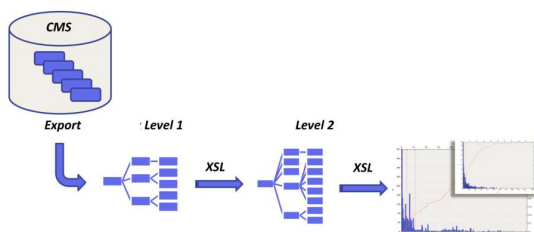
W. Ziegler

Karlsruhe University of Applied Sciences, Faculty of Information Management & Media

INTRODUCTION AND OBJECTIVES

Component content management systems (CCMS) have become in certain global areas, for example in Central Europe, a standard toolset in technical communication (TC) [1]. They allow in a process-oriented and systematic way the creation and aggregation of content into document structures by reuse and subsequently publishing of deliverables in multiple media. However, in many cases, neither precise quality assurance processes are integrated in the workflow, nor standard mechanisms for gaining corresponding key performance indicators (KPI) describing CCMS process quality.

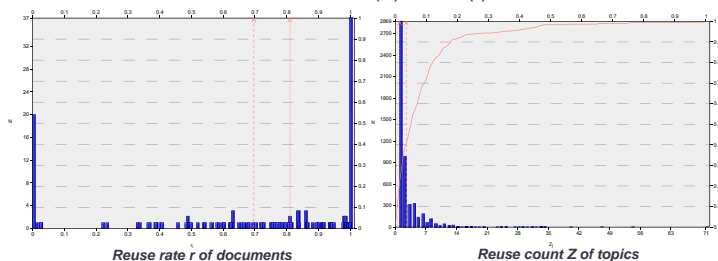
In order to improve this situation, corresponding KPI have been defined for the core mechanism of CCMS, i.e. for measuring the efficiency of content reuse within document structures [2]. From this, further basi and correlated quantities can be derived on a theoretical and practical basis. In contrast to other approaches [3], our methodology is independent of any specific implementation of XML information or content models or even of the data format. It is also independent of specific CCMS features. For this purpose, we solely rely on the generic concept of documents structures populated by referenced content objects building usually a tree structure of nested objects. This concept covers therefore the various types of standard or specialized CCMS implementations as well as standard frameworks like DITA-topics and corresponding maps [3]. By this, we developed a generalized reuse metrics (GRM). For practical applications, we use a generic XML exchange file format developed earlier. It has to be exported by the systems and carries CCMS information about content objects, document trees as XML data and corresponding metadata. Content itself is neither included in the export (level 1) nor in the analytics data (level 2) and KPI visualization.



CONCEPT AND IMPLEMENTATION

From the export data file one can calculate all GRM quantities. There are two base quantities of a reuse metrics: The redundancy r of documents describing the relative amount of therein reused content, whereas the abundancy Z of content objects (usually topics) describes the number of reuses per object.

For a given system, these quantities can be depicted as distribution functions of the absolute numbers $N(Z)$ and $N(r)$ contain:



From this starting point and using metadata included in the export file, one can calculate for example the following static quantities for different object types:

Documents: number of contained words or topics, sharing factor (saving factor) as the weighted average of Z per topic contained in individual documents

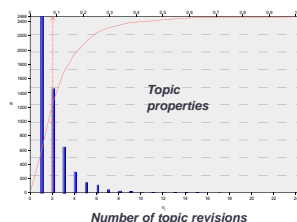
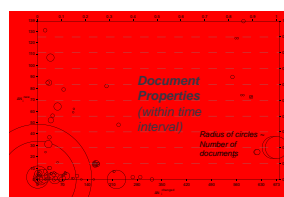
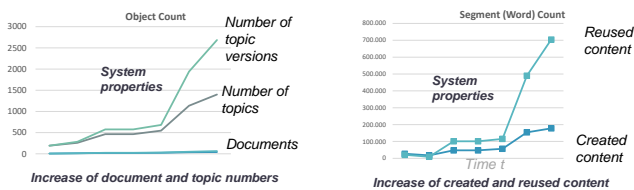
Topics: number of revisions, number of contained words or fragments

Fragments: reuse count, fragment type

Media: reuse count, data size, number of revisions

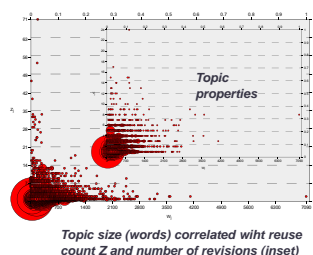
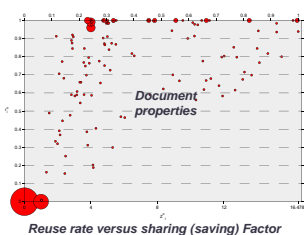
Dynamic Quantities

Investigating the time dependence of static quantities reveals the continuous development of e.g. system use, content reuse and the evolution of content dynamics resp. document creation processes



Correlated Quantities

For detailed analysis, correlations of base quantities reveal dependencies and anomalies in object or system behavior.



RESULTS AND OUTLOOK

- The GRM together with the export mechanism of raw CMS reuse data can be applied successfully to obtain relevant KPI for content management applications.
- CMS user companies obtain quantities of the GRM on different analytic levels: for management communication, for departmental workflow tracking and improvement and on a detailed authoring workgroup level among technical information creators
- For structured analysis and improvement of CMS processes (variant management, metadata use, versioning, reuse) data must be represented also as tabular data (e.g. spreadsheets) including corresponding metadata for filtering

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ACKNOWLEDGEMENTS

We acknowledge technical support by Claudia Oberle who implemented the numerical algorithms and performed the calculations. We acknowledge also the continuous cooperation with CCMS vendors Docufy, Expert Communication Systems, Fischer Information Technology and Schema and with all companies and system users providing their (anonymous) data for research.

Ontologies and use case based planning of content delivery

Daniela Burkhardt, Stefanie Clesle

University of Applied Sciences Karlsruhe

ABSTRACT

The goal of our research was the development and presentation of an ontology-based Content Delivery Portal (CDP) in combination with use cases. The aim was to find out how to enrich content in general through an ontology and to investigate the added value of ontologies compared to classical metadata in the Content Management System (CMS) and in particular how content can be delivered in CDP via an ontological context.

Our focus was on the *knowledge builder* of the ontology system manufacturer i-views for modelling the ontology and embedding content. Furthermore we planned a CDP and implemented our model in the CDP *i-views content*. To accomplish this, use cases were developed to derive which information users want and when and how to grant access to the desired content.

METHODS AND APPROACH

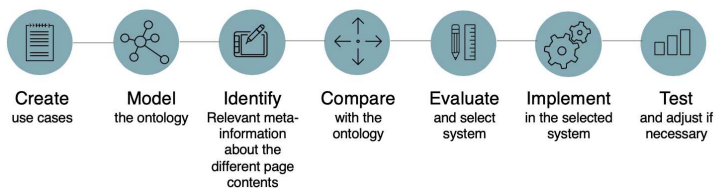
Use Case Planning

- The possibilities for building an ontology or a CDP are unlimited. In order to identify what is relevant for the user, use cases should be defined at the beginning of the project.
- Initially it was determined that we would not approach the project from a component-oriented. Instead, we provided information that enables users to explore the topic of the smart home in general and to link together knowledge.
- The modelled use cases had to be constantly adapted and checked throughout the entire project.
- We recommend a tabular form for the best possible development of use cases. See the following table for an elaborated example of a use case: [1]

Use case	How can I save energy in the kitchen? Anne cooks every day. She needs a lot of energy. She wants to know if there are some smart home devices which could help her save energy and costs in the kitchen.
Situation (actor, knowledge level, implementation scale)	<ul style="list-style-type: none">• private person• knowledge level (in terms of smart home technologies): beginner
Intent	<ul style="list-style-type: none">• uses a lot of energy in the kitchen; accordingly, wants to save energy
Output	<ul style="list-style-type: none">• devices that fulfill the purpose energy efficiency and/or cost efficiency• general description of the corresponding devices
Input	<ul style="list-style-type: none">• purpose: energy efficiency, cost efficiency• room: kitchen
Scenario	<ol style="list-style-type: none">1. User opens CDP.2. CDP shows facets.3. User chooses facet "kitchen".4. CDP filters content.5. User chooses facet "energy efficiency" and "cost efficiency"6. CDP filters content.7. User chooses facet "general description".

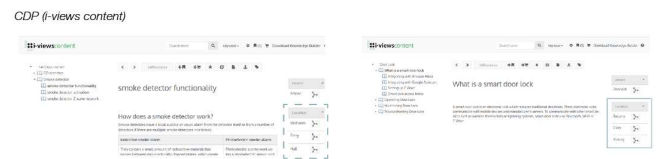
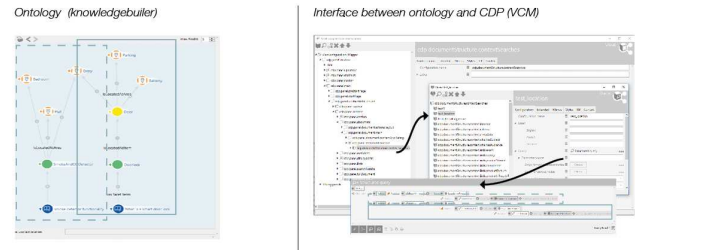
How to plan a CDP based on ontology

The process of planning a CDP based on an ontology follows the steps below. These steps do not need to be executed in a chronological order but can instead overlap and influence each other. [1]



CDP based on Ontology

The *i-views knowledgebuilder* is a tool to develop ontologies. As an interface to their own CDP, they offer a built-in configuration tool, known as the *ViewConfig-Mapper (VCM)*. In the *VCM*, elements, panels and views are configured modularly. It is possible to edit both the graphic display and the functions of the GUI elements. For the latter, structured queries and extensions with JavaScript are used. [2]



CONCLUSION

We have showed the key steps for planning a CDP. Decisions during this phase have to be based on use cases. The implementation of our project was fully based on the ontology we developed over the course of the project. Although we presume that part of the implementation could have been realised with metadata from a CMS, the ontology can be used to provide context information that goes beyond the metadata that is traditionally assigned to individual topics in a CMS. By using the software *knowledgebuilder* and *i-views content*, the user can browse through the ontology and thus recognize the correlations and connections. In principle, the software *i-views* can be used to create queries of any complexity that evaluate the ontology. Due to the current status of the technology, data cannot be exchanged smoothly between *SMC* and *i-views*. The lack of cross-tool-standardization led to additional manual effort, which would presumably be eliminated in future versions.

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ACKNOWLEDGEMENTS AND CONTACTS

We would like to express our gratitude to the International Office at Karlsruhe University of Applied Sciences, the University of Aizu, the Faculty of Information Management and Media, and the Master's program of Communication and Media Management at Karlsruhe University of Applied Sciences for the generous financial support that made this project and exchange possible. Furthermore, we would also like to thank intelligent views GmbH for providing their software for us to work with, and especially Dr. Achim Steinacker for helping us to tackle technical questions involved in the implementation.

Contacts

Burkhardt, Daniela: buda1031@hs-karlsruhe.de
Clesle, Stefanie: clst1012@hs-karlsruhe.de

Optimizing product and content quality by content lifecycle monitoring from CMS to CDP

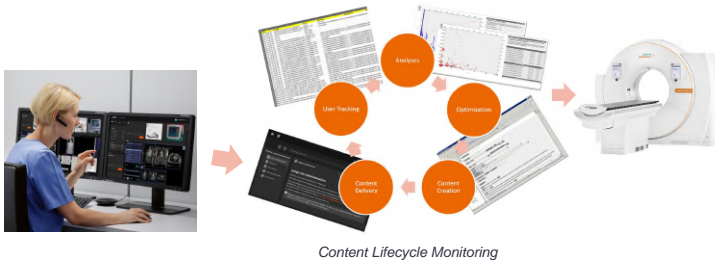
C. Deschner¹, W. Ziegler²

¹Siemens Healthcare GmbH ²Karlsruhe University of Applied Sciences, Faculty IMM

INTRODUCTION AND OBJECTIVES

In order to improve product and process quality in terms of effectiveness and efficiency, Technical Communication as a PLM process should be monitored, evaluated and assessed. Whereas efficiency of editorial processes and tools can be monitored by established methodologies like GRM analyses [1], evaluating effectiveness requires reliable information about user's behavior [2]. Effectiveness of information is much more than only counting the number of page calls. It's about qualitative properties like relevance and findability of information. Turning utilization data into value is thereby much more complex. Based on a significant amount of data, user interactions must be analyzed in context of chronological sequences of interactions – the user's journey from questions to answers. Once typical, recurring interactions patterns are identified and understood in context of product usage, relevance of certain types and areas of information can be assessed as well as findability and expected terminology. With the conclusions drawn, scope, structure and terminology can be optimized. By combination of methodologies for qualitative and quantitative analysis of content creation, content delivery and content perception, the entire content lifecycle can be monitored.

Since Content Delivery Portals (CDP) are required to automatically follow system configuration and status, as well as users' working contexts, they need to be integrated as any other system component to make use of basic infrastructure like session management and system monitoring. Consequently, evaluation of CDP utilization data can also help to get a better understanding of user behavior and draw conclusions regarding quality and usability of the products itself.



Content Lifecycle Monitoring

CONCEPT AND IMPLEMENTATION

In order to collect and process CDP utilization data as a part of the entire system and product usage, CDPs have to be integrated deeply in products.

Depending on the CDPs system architecture and content structure, it has to be ensured, that all relevant user interactions can be tracked in chronological order and allocated to distinct sessions.

For evaluation of the entire content lifecycle, it's absolutely essential to make any relevant information object accessed in CDP traceable to the respective object in CMS, for example by using unique and stable object identifiers in all stages and tools involved.

Workflow for processing and analyzing utilization data:

- Tracking user interactions*
- Logging and provisioning of information access data*
- Normalization and processing
- Identification of usage and behavior patterns
- Quantitative analyses
- Qualitative analyses
- Identify potential for optimization
 - Optimization of editorial processes
 - Sharpening content scope
 - Optimization content structure
 - Identify potential weaknesses in product usability

*) Anonymized data – with explicit customers consent

For getting meaningful and beneficial insights and results, these methodologies must be applied in context of a deep understanding of the products portfolio, integration scenarios and underlying PLM processes.

RESULTS AND BENEFITS

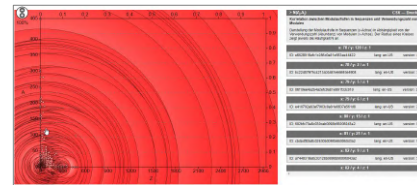
Based on the combination of CDP utilization data and editorial KPIs from the CMS, following quantitative and qualitative insights can be evaluated:

Quantitative insights:

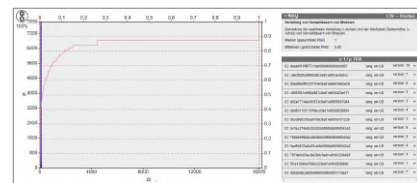
- Most frequently called content with relevant reading time
- Frequently searched terms and expected terminology
- Relevance of specific content languages
- Acceptance of specific content types

Qualitative insights:

- Users strategies in information retrieval
- Content and structure error pattern and gaps
- Gaps in terminology
- Different user profiles
- Typical user questions and information demands
- Key patterns and profiles of highly relevant content objects
- Efforts spent for high and low relevance information



Call-up rates (CDP) by reuse rates (CMS) for content objects



Reading times on content objects

Search Terms	Usage (successful sequences)	Usage (in total)
control point edit	10	12
fusion	9	11
perfusion	8	9
shortcut	8	10
voi isocontour	6	6
lines	6	6
sustraction	5	5
jpeg	5	5
region growing	5	17
save log	5	9
anonym	5	5
segmentation	4	5
volumetry	4	5
VNC	4	6
ret filter	4	5
vrt	4	8

Most frequently searched terms and success rates

Benefits:

Results and insights from content lifecycle analysis can be used for...

- Sharpening the scope of product information (effectiveness)
- Optimizing efforts for creating most relevant content (efficiency)
- Improvement of editorial quality (content and information structure)
- Terminology improvement (same language as the customer)
- Definition of content acceptance criteria
- Detection of potential product usability weaknesses

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ACKNOWLEDGEMENTS

We acknowledge technical support by Claudia Oberle who implemented the numerical algorithms and performed the calculations. We acknowledge the continuous cooperation with the CCMS vendor Docufy as well as with all companies providing their (anonymous) data for research.

Ontology Based Modelling for Content Delivery Systems

Lena Padeken and Annika Bürkel

Karlsruhe University of Applied Sciences, Faculty of Information Management & Media

ABSTRACT

Content Management and Content Delivery help to deploy specific information when needed. Therefore, a concise metadata concept is required. Metadata management based on an ontology can have advantages in comparison to a taxonomy based metadata concept in terms of displaying linked information that relate to one another. Our goal is to identify the advantages of an ontology system over a content management system including the transformation process for an external content delivery system for delivering content. Therefore, we created our metadata concept in the ontology system i-views Knowledge Builder and converted the output for it to be integrated in an external content delivery system such as TopicPilot.

APPROACH

On the basis of several use cases, we created a metadata network in the form of an ontology. The ontology modelling describes the intermediate step between content creation in a content management system and displaying content in a content delivery system (figure 1).

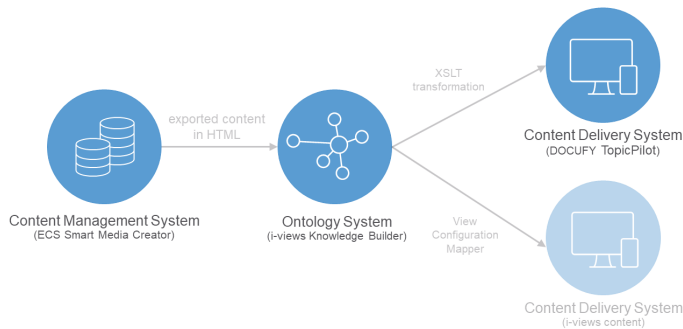


Figure 1

The approach is to enrich the content with metadata, which were created in the ontology system Knowledge Builder by intelligent views (i-views). This package of content linked with the ontology is exported and transformed to be displayed in an external content delivery system (DOCUFY TopicPilot).

For the realization of our knowledge network that represents our metadata, the ontology system Knowledge Builder provided by i-views was used. Knowledge Builder offers following special features:

- Creation, editing and graphical visualization of metadata and their relations in an ontology.
- Provision of a content delivery solution that is linked to the knowledge network, which enables direct updates in the system.
- Contents from various content management systems can be integrated via common standards and cross-linked via the ontology.
- Logical queries help retrieving use case specific information.

Knowledge Builder allows the creation of types of objects with their corresponding specific objects, which describe the lowest level of information. Specific objects can be linked by a relationship type. These relationships help to retrieve related contextual. In addition, specific objects can possess characteristics in the form of attributes [1].

Ontologies are described with languages like RDF (Resource Description Framework) or OWL (Web Ontology Language) [2]. Knowledge Builder also writes its output with RDF including OWL. To transform the ontology content, XSLT is used to generate files for a content package, which is needed to create content in a Content Delivery System (figure 2) [3].

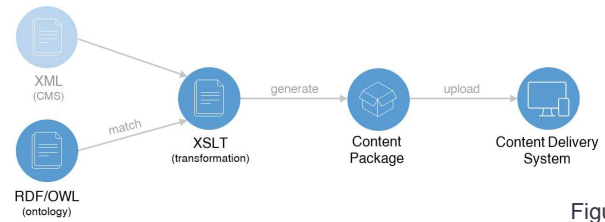


Figure 2

Figure 3 shows an example of how ontology content can look like in a content delivery system: The content is displayed in topics which can be found by filtering metadata or searching for specific keywords.

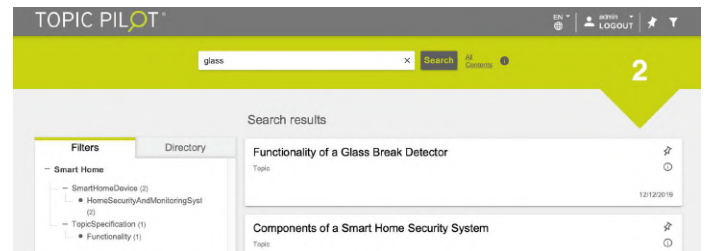


Figure 3

The key reasons for performing the transformation are:

- The ability to filter more than two hierarchy levels is restricted.
- Given relationships can be used for filtering and adding context information.

CONCLUSION

It might be easier to display facets by using xml export files from content management systems but they do not provide relations between topics or subordinate components. Missing this information, every topic is delivered and retrieved individually. Ontologies close this gap by relating topics to each other. This relation can be made visible by dynamic links inside the abstract of each topic (meta information) or by static links inside the content of each topic. Providing such additional context information, the transformation of ontology content to delivering content in a content delivery system brings us closer to the creation of microDocs.

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ACKNOWLEDGEMENTS

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Approaches for Deployment and Access of Content in Delivery Portals

Theresa Rauffmann, Monika Wolf
Karlsruhe University of Applied Sciences

Introduction

Search engines are ever-present in our everyday life. The most used search engines providing us with various information are Google, Yahoo!, Bing, Baidu and YANDEX RU [1]. They present search results when the user, for example, searches for a restaurant nearby, for specific products or simply to retrieve general information of just about anything.

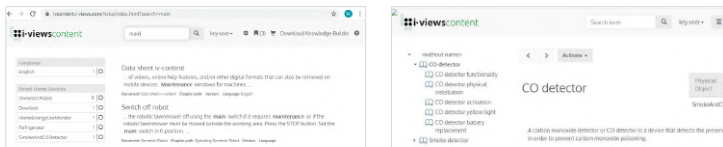
In our research we dealt with search engines in a very specific field. Companies try to use enterprise search systems to provide users with the necessary information needed for their situation in the shortest possible time. We investigated two approaches to provide content for the user, tested the possibilities of filtering and elaborated on which use case best fits to which approach by means of two different Content Delivery Systems.

Objectives

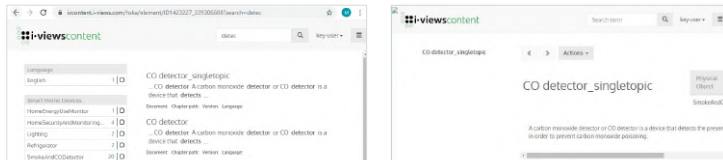
Single topic book vs. document book

The content that was used for the research was all about the subject smart home. It was created in the Content Management System named Smart Media Creator (SMC). The following screenshots show the different approaches for access to content in the two Content Delivery Portals (CDP) i-views and SCHEMA CDS. For each CDP there is a screenshot of the document and the single topic book.

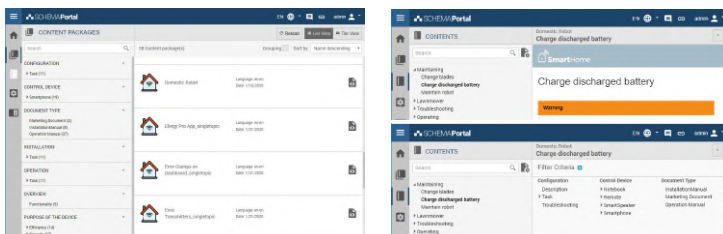
Document books in i-views



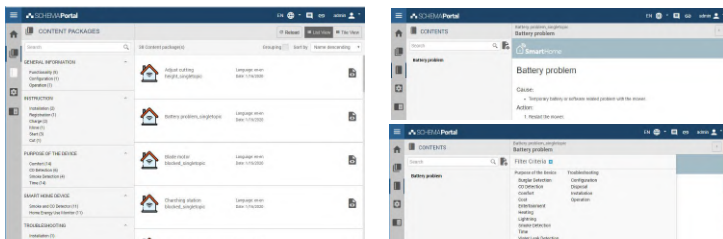
Single topic books in i-views



Document books in SCHEMA CDS



Single topic books in SCHEMA CDS



Neither document books, nor single topic books, offer best access possible for a user of a CDP. There is also a third approach called microDoc.

A microDoc is a set of topics that are combined by defined use cases and logical relation and are deployed in a CDP. Implementation phase one is a specified and static aggregation of microDocs based on individual use cases.

Example Rules for microDoc in the context of smart homes

In our research there are four different types of topics: description, task, troubleshooting and glossary entry.

- A microDoc consists of at least 3 topics and at most 7 topics.
- A microDoc can contain content about different smart home devices (for the use case general information). But it normally contains content about one specific smart home device.
- A task always comes with a description and if available the description of the functionality, a troubleshooting topic and a glossary entry.
- If several different tasks must be performed to complete a task, then they belong to one microDoc.
- A microDoc only consists of different troubleshooting topics in individual cases, should they be coherent. Otherwise the user isn't interested to know how to solve other problems.



Conclusions

Single topic book vs. document book

We assumed that people are used to document structures and use the table of content of the document to navigate. Therefore, the document books offer a common access to the user. The single topic book only offers the facet filter to navigate. Hence, the access to a single topic book has to be in a clearly arranged structure.

microDocs

In our research the ideal way of using the single topic books is with the described microDocs as an add-on. This would be an approach of combining the two aforementioned methods. MicroDocs don't provide as much information as whole documents do and don't provide too little information without context as single topic books do. The best way to implement microDocs would be by means of automated creation.

Compatibility of different tools

Using different tools can cause problems because of the missing standardization of exchange formats. Even with standardized exchange formats like iIRDS, using different tools can be complicated since the terminology of the metadata has to be exactly the same in both tools.

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Acknowledgements

The authors would like to thank the International students' registry, the Faculty of Information Management and Media, the AstA Studierendenschaft HsKA, the Master's Program Communication and Media Management for financial support, Achim Steinacker and intelligent views GmbH, Tim Rausch from Schema GmbH and Ladivia Roehrl from Expert Communication Systems GmbH for great collaboration, insightful discussions and support and Professor Roy from University of Aizu for the organizational support.

Contact: Monika Wolf, womo1012@hs-karlsruhe.de and Theresa Rauffmann, rath1019@hs-karlsruhe.de

Data Transformation from CMS to CDP Enriched by Semantics

Salwitzek, Christina | Steuer, Christina

Karlsruhe University of Applied Sciences

ABSTRACT

Today's users no longer expect a classic manual, but short, clearly structured pieces of information that fit their application context, use case and role. Instead of conventional documentation, "intelligent" information is required that is modular, format-neutral and can be found via metadata and full-text search. [1]

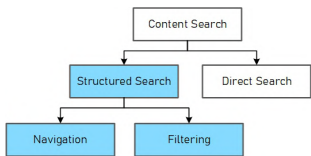
Intelligent information is often created in Content Management Systems (CMS) and provided via Content Delivery Portals (CDP). There are not always compatible interfaces between these systems, especially those of different software manufacturers. Therefore, the information created cannot be processed further. In this case, data transformations were developed, enriched by semantics and implemented within the project. These data transformations provide accessibility for the information from one system into several systems.

OBJECTIVES

To make information accessible, it must be published in a valid format in a specific system. To provide target-group and context-based information as quickly as possible, the information should be published in a CDP.

1. Concept of Content Retrieval

Content should be situational and selective. To make the content situational and selective, the concept of Content Retrieval is used within a CDP to make the information accessible efficiently. Content Retrieval is the search for information in a specific portal, for example, a CDP. Based on Content Retrieval there are two main approaches to search for information within a CDP. [2]



These approaches include the direct and the structured search. The main difference of the approaches is the usage of metadata. Within the structured search there is also a differentiation between navigation and filtering. [2]

Within the project the concept of Content Retrieval was used to structure information efficiently and to demonstrate different approaches of searching for information.

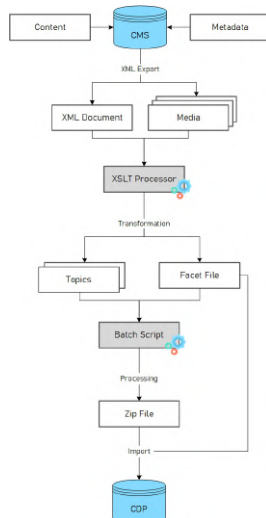
2. Data Transformations (Objective 1)

→ Transferring content from a Content Management System into different Content Delivery Portals.

Data sources that can be used for data transformations are CMS, ontology editors and other databases (e.g. product information systems). [3]

There are three major parts within a data transformation:

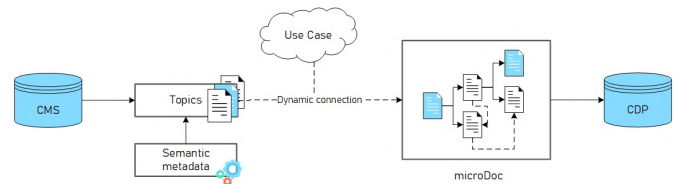
- Preparation and standardization of the content and metadata in the CMS and the export as a XML document.
- Transformation of the CMS data with XSLT into the target format and the creation of content packages using a batch script.
- Import of the created content packages and the facet file into the CDP.



3. Enriched Data Transformations (Objective 2)

→ Transferring "intelligent" content from a Content Management System into a Content Delivery Portal.

The content from a CMS can be enriched by using metadata or the concept of microDocs. Metadata and the modularity of the information make it possible to dynamically generate microDocs. The created microDoc is a combination of topics that are connected by defined use cases and a logical context. [4]



CONCLUSIONS

The objectives of the project were achieved by successfully transforming data from a CMS and importing it into three CDP of different manufacturers. Although the transformations are similar in structure, they differ in system-specific adaptations, which are the result of manufacturer-specific implementations.

The data generated by the transformations become "intelligent" by enriching them with concepts based on metadata. One concept emphasized on the project is the concept of microDocs, which can support not only the users with their search for information, but also the creators. During the project a specific system (Schema CDS) was focused on in detail and it was discovered that at the moment there are already integrated support functions for microDocs (both interactive and automatic). It is expected that even more extensions for microDocs will be implemented in the future.

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ACKNOWLEDGEMENTS AND CONTACTS

Acknowledgements

The authors would like to thank the International Office, the Faculty of Information Management and Media as well as the Master's Degree Program Communication and Media Management of Karlsruhe University of Applied Sciences for their financial support. Thank you to Dominik Kremer (Docufy GmbH), Tim Rausch (Schema GmbH) and to Lena Padeken (Karlsruhe University of Applied Sciences) for the great collaboration, insightful discussions and for their support. We would also like to thank Prof. Roy (University of Aizu) for the organizational support and Mrs. Berumen-Roden for the proofreading of this poster.

Contacts

Salwitzek, Christina: sach1023@hs-karlsruhe.de
Steuer, Christina: stch1033@hs-karlsruhe.de

Smart Home Ontology

Kagome Naya and Kudry Peter

with supervision from professor Debopriyo Roy, Ph.D.

Introduction

This poster outlines the key concepts covered within the Technical Writing in Software Engineering course with the main topic being Smart Home and Ontology related to this subject.

What is a Smart Home ?

A house or apartment that can be controlled with a smartphone or that can even manage itself.



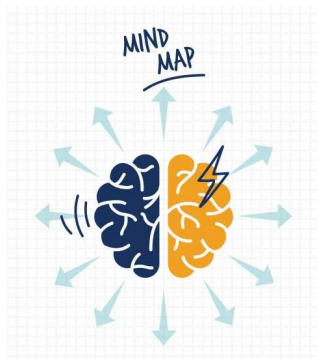
Mentoring role of the graduate students

The role of the graduate students, namely Peter and Naya, was to mentor the undergraduate students and serve as a communication link between the graduate students of HSKA, Germany and undergraduate students of University of Aizu, Japan.



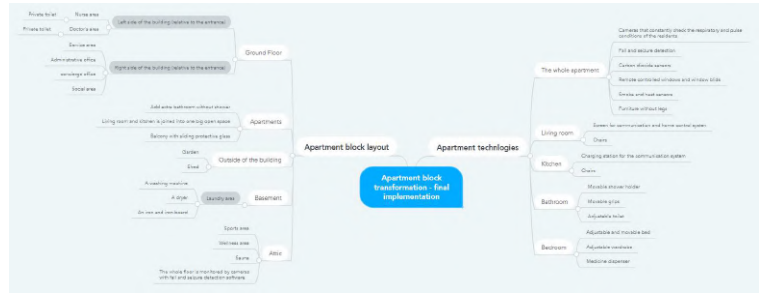
What is Ontology ?

A set of attributes and properties of a certain subject that was defined according to certain traits and relationships between them. A perfect example of this concept is so called 'Mind Mapping'.



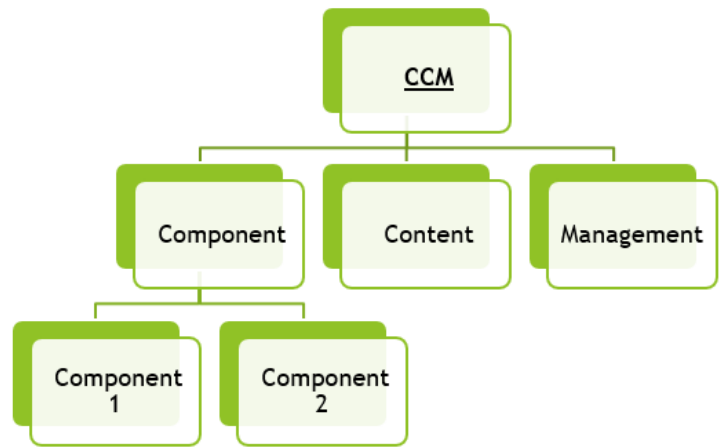
Mind Map of a Smart Flat

The following mind map displays features and operations that should be performed in order to convert an ordinary block of flats into a smart building containing smart flats whose attributes are targeted towards elderly people with disabilities or seniors with predisposition to become disabled later on during their senior years. These disabilities could be Alzheimer's, Sclerosis Multiplex or motoric paralysis.



Component Content Management (CCM)

Component Content Management is a strategy of managing components at granular level rather than at document level. Each component can represent a topic, asset or a concept. Therefore, CCM can be considered as one of the principles of Ontology as it conceptualizes the segregation of attributes in their respective subsets based on their similarities. This can be also observed in the Mind Map above and symbolic hierarchy below.



Content Delivery Platform

Content Delivery Platform is usually a service that uses embedded software to deliver web content. However, a great example of content delivery platform within a smart home is the centralized control device that can control every smart device within ones home. This creates a single point of delivery of the information about the property and can provide further distribution of data to smartphones or computers through which it is as easy to consume data as through the actual control panel.



Levels of Intelligent Information Access Using Ontology Transformations

Lena Wenner and Nergis Kuru

Karlsruhe University of Applied Sciences, Faculty of Information Management & Media

ABSTRACT

Techniques of intelligent information access already go beyond the mere provision of static information attempting to overcome the limitations of current search platforms. This project aims to investigate different levels of intelligent information access using the approach of ontologies and ontology transformations. For this, we decided to use Ontolis as a web-based tool for modeling, displaying and transforming information about Smart Homes.

OBJECTIVES

Many researchers have already commented on the benefits of ontologies. They are to model semantic networks and relations and at the same time they provide users with intelligent information that meets their needs, preferences and usage patterns. In this study we understand intelligent information as information that can be requested, processed and delivered both manually and automatically according to corresponding use cases [1].

In the following, we first describe the different methods of intelligent information access and show how these were applied to our specific use cases based on the ontology we developed for Smart Homes.

Filtering

We regard rule-based information filtering as a method to delete non-relevant information without changing the original structure of the ontology [2].



In our case, we defined a set of so-called *Validity Rules* that could include all elements of the ontology (classes, relationships, attributes, instances). These rules instructed the filtering component as soon as the conditions of a rule were met.

Transformation

The Elements of an ontology (source ontology) can be transformed into a different structure (target ontology) through semantic transformation taking advantage of logical ontology patterns [3]. These patterns consist of links that indicate which elements of the source ontology should be transformed into which elements from the target ontology [4].



Within the framework of our study, we defined the logic of transformations with *QIRA*, the Ontolis-specific transformation language. Depending on the user's request, the source ontology was transformed into a target ontology, that differed from its "origin" both in the number of elements and in its structure. It provided the user with the relevant information according to the requested use case.

These first two levels use direct user input implying that certain manual requests are required. At higher automatization levels of intelligent information access, the information is no longer requested manually but triggered automatically.

Intelligent Publication

Intelligent publication is defined as the dynamic aggregation and delivery of information in a non-ontological representation. On this level, the delivery of content is usually context- or event-driven.

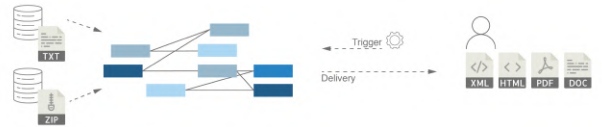
This approach is similar to the idea of micro-documents aiming to provide information only to the extent required by users [5].



Based on our logics of transformations in *QIRA*, the elements of the ontology were converted into another format, i.e. HTML, offering a web-based access to the aggregated content.

Intelligent Content Delivery

In the process of intelligent content delivery, information from various domains or data sources is aggregated through ontologies [6].



In future research projects, we would like to link information from different sources, such as Content Management Systems (CMS), using ontologies and transform them into one single target form.

DISCUSSION AND CONCLUSION

Ontology transformations can process large semantic models effectively and provide personalized and use-case-specific information. This way, they can improve making information truly intelligent. However, the outcome of transformations does not offer the same value among all users. End users only benefit if the results are presented in a media-specific format. In our project, we managed this by starting at the level of intelligent publication.

Since transformations strongly rely on the modelling of the ontology, the first steps are to define the domain and develop specific use cases that will guide many of the modelling decisions down the road. These steps will also have a significant impact on the application of ontology transformations. This means that the logic of the transformations is limited to the semantic depth of the ontology.

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ACKNOWLEDGEMENTS AND CONTACTS

We would like to thank the International Office, the Faculty of IMM, the AStA Students Union, the master's program CMM from HsKA for financial support, Thomas Weinmann and Christian Koller from Ontolis for great collaboration, insightful discussions and support and Professor Roy from University of Aizu for the organizational support.

Lena Wenner: wele1024@hs-karlsruhe.de
Nergis Kuru: kune1012@hs-karlsruhe.de

About the Editor:

Prof. Dr. Debopriyo Roy is a professor of technical Communication and usability, teaching specialized English language courses to computer science majors at the Center for Language Research – University of Aizu (UoA), Japan. He has over 20 years of teaching and research experience in technical documentation, UX Design, usability testing methods, computer-assisted language teaching (CALL), and task-based language teaching (TBLT). Prof. Roy is the director of the CLR Technical Communication Laboratory; supervises the JTCA technical communication certificate program at the UoA; supervises the academic exchange initiative between the UoA and the Karlsruhe University of Applied Sciences (HSKA), Germany; and assists the Silicon Valley Internship Program at the UoA.

He teaches advanced graduate and undergraduate courses in technical writing, interface design, and technical documentation procedures besides other writing courses. His research projects are focused on language studies based on usability testing methods, technical procedures and manuals design, technical presentations, and interface design and business communication strategies. Prof. Roy has published in premier journals and conference proceedings on topics related to technical communication and usability in computer assisted language learning and were actively involved with the IEEE Professional Communication Society and its Japan Chapter as the chair. He is also an active board member of the ACM Professional Chapter on ELearning and Technical Communication and organizes international conferences and partnerships.

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This chapter is broadly focused on the use of technical documentation and use of communication patterns for e-learning purposes. Much of the research discussions related to this chapter is associated with the use, design and testing of software and other interfaces for e-learning perspectives. Further, research projects in technical documentation emphasize the user-friendly application of text and graphics for commercial products

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ISSN: 2434-9526
