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ETLTC2021

MESSAGE FROM THE EDITOR

The 3rd ETLTC2021 international conference was built on the foundation laid with the 1st & 2nd ETLTC international conferences. ETLTC2021 was held entirely virtually and hosted from the picturesque University of Aizu campus at Aizuwakamatsu city from January 27-30 2021. The event was highly successful, attended by over 120 participants including delegates from more than 12 different countries from all across the globe, and many other Japanese universities, and including members from the German and Japanese industry. The theme of the conference focused on different fields related to computer science and technology and covered different topics in educational technology, technology-assisted language teaching, smart cities, and technical communication. Interesting interdisciplinary presentations covered different topics related to architecture, design and technology, biomedical engineering, robotics, and language learning, content management, and delivery, etc to name a few. The presentations made at this conference from Germany, Mexico, Greece, Poland. Indonesia, Nigeria, Russia, etc., and other Japanese universities including the group presentations from Karlsruhe University of Applied Sciences (HSKA), Univ. of Western Macedonia, Greece, and Univ. of Monterrey, Mexico were highly interactive and helped us see the changing tides and the emerging importance of the multidisciplinary approach in education in this COVID-19 landscape. It helped us explore how our future will look like in a not-so-distant future, how different technologies will reshape our ideology and how different sectors will embrace evolving disruptive technologies.

The abstracts and posters in this proceeding volume 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. Also, ETLTC2021 was held in conjunction with the ISSM2021 symposium on spatial media, and this collaboration was a great success with participants from Australia, Germany, etc. collaborating with ETLTC2021 participants in engaging discussions. Heartiest thanks to close partners Prof. Wolfgang Ziegler (HSKA), Prof. George Fragulis (UWM), Prof. Hiram Campos and Prof. Ana Romero (Univ. of Monterrey), Prof. Johnson (Univ. of Sunderland), Prof. Brine (Univ. of Waikato), and Prof. Martens (Univ. of Sydney), and colleagues from the Univ. of Aizu such as Prof. Miyazaki, Prof. Cohen, Prof. Pyshkin, Prof. Abderazek, Prof. Naruse, Prof. Hamada, Prof. Kawaguchi, Prof. Heo, Prof. Ilic, Prof. Blake, and many others; and Prof. Kuroda (JTCA & Osaka University). I would also like to thank the reviewers from the University of Aizu, and many other universities worldwide who spent their valuable time with intense feedback for our authors.

We will look forward to carrying on with this initiative and develop a robust partnership for research and teaching collaboration in years to come. We are extending our network and partnership and we welcome members from the academic community who would like to join our conference committee as volunteers.

Hopefully, the world will be back on her feet by the time we meet again in January 2022 and hoping to see you all on our beautiful campus at the University of Aizu, Japan. Please stay safe and have a wonderful year ahead.

Best Regards,

May 2021
Debopriyo Roy
Editor-in-Chief, ACM Chapter Proceedings on Educational Technology, Language and Technical Communication 2021

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THE PUBLICATION

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NEEDS ANALYSIS WITH MIXED METHODS IN CALL RESEARCH

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This paper discusses arguments on necessitating needs analysis with mixed methods in computer-assisted language learning (CALL). CALL researchers argue that a lack of technology integration planning hinders using technology effectively in schools. This would be because teachers may not be well-prepared regarding the use of technology leadership and integration, calling for needs analysis. The purpose of this paper is to examine the definition of needs, potentials, and challenges of using mixed methods to develop needs analyses and concludes with the considerations of needs analysis with mixed methods in CALL research.

Keywords:
Needs Analysis
Mixed Methods
Computer-Assisted Language Learning (CALL)
Research Methodology

PREDICTION OF GENERAL ESL PROFICIENCY WITH LEARNERS' DICTATION PERFORMANCE

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Keywords:
English as a second language
general proficiency
dictation performance

This study analyses the extent to which dictation performance and linguistic features (linguistic difficulty of sentences dictated by learners) can predict general proficiency in English as a second language (ESL). To this end, this study constructed multiple linear regression and non-linear regression models that predict general ESL proficiency (in which independent variables were the dictation performance scores and the linguistic features of sentences), and verified the correlation between the predicted and observe general ESL proficiencies. The results showed that general ESL proficiency could be predicted by dictation performance and linguistic features. Further, the results showed significant effects in dictation accuracy, sentence length, and mean word length.

DISTANCE LANGUAGE LEARNING IN THE TIME OF COVID-19: FINDINGS FROM A CONTEXTUAL MULTI-NATIONAL STUDY

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Keywords:
distance language learning
COVID-19-induced school closures
pandemic pedagogy
quaranteaching
adaptation to emergency remote instruction
global survey
coping
engagement

We present the findings of a global longitudinal study (involving over 6,000 participants from 118 countries) investigating how language teachers and learners, as well as linguistics instructors and students, have been handling the 2020 transition to emergency remote instruction. We begin by revealing easily interpretable clusters of naturally correlating variables (Fig. 1). Crucially, the giant component of the four highly interconnected clusters associated with i) self-regulation/leadership-organization potential, ii) engagement/openness, iii) positive orientation, and iv) social skills/contacts (left-hand-side of the graph) has a predominantly positive valence, while the three peripheral clusters related to v) family relationships, vi) future expectations and vii) remote instruction-related experiences and perspectives on students' coping (right-hand-side) are mainly negative. We also identify clusters of better- and worse-coping teachers and learners, as well as the following meaningful distinguishing features: preparedness level and support received, effectiveness and engagement in using new technologies, perception of students' coping, logistic problems, and general positive orientation in the case of the educators, and motivation, engagement in the learning process, difficulties with staying focused, concern regarding the assessment of in-class activity, the teachers' ability to meet individual/special needs, initial confidence in the ability to learn remotely, general attitudes towards distance teaching, and interaction with the teacher and classmates in the learners' population. We present and discuss the findings against the backdrop of contextual variables identified as significant moderator predictors: education level handled, mode of delivery (synchronous vs asynchronous), and the economic status of the respective countries. The findings offer valuable guidelines for the current context of the second wave of the pandemic, as well as help language teachers and learners as well as stakeholders outside the narrow context of distance learning.

PROMOTING ENGLISH SPEAKING CONFIDENCE THROUGH ONLINE EXPANDING CIRCLE COMMUNICATION

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Keywords:
EIL
intercultural communication
Online English learning

In this study, we explore how intercultural communication between L2 English learners from three different expanding circle countries (Japan, China, and Vietnam) via Zoom promotes L2 confidence in English speaking. We introduce the idea of "English as an International Language (EIL)" to EFL students from three expanding circle countries [1], where English plays no historical or governmental role but is nevertheless widely taught as a foreign language, through readings and quizzes in an English class. Students, then, discuss EIL-related topics from the readings with their group members from other countries via Zoom meetings. Japanese university students enrolled in the English class participated in 4 sessions of English discussion with Chinese and Vietnamese students through Zoom. To examine how their confidence level in speaking English changed through practicing EIL with the speakers of expanding circle countries, the 'Confidence in Speaking Questionnaire' designed by Griffee [2] was utilized to measure their confidence before and after the treatment. Students also evaluate their own self-introduction videos, which were recorded at the beginning of the course, before and after the treatment to see whether their experience of expanding circle communication help them evaluate their English speaking more positively after the treatment. After the completion of all sessions, reflective writings were collected for a qualitative analysis of how their L2 speaking confidence and attitude about English was influenced by the cross-cultural communication experience. The results show that their overall L2 speaking confidence increased after the treatment. The results indicate that students gained more confidence in their English after learning about EIL and practicing EIL in an intercultural environment on Zoom. The analysis of their reflective writings shows the participants changed their attitude toward English through the 4 online sessions of intercultural communication, which potentially can lead to enhanced L2 speaking confidence and motivation in the long run.

DEVELOPING EFL LEARNERS' COMMUNICATIVE COMPETENCE THROUGH TECHNOLOGY-MEDIATED TBLT

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Keywords:
Technology-mediated TBLT
TBLT
EFL

This study explores how technology-mediated Task-based Language Teaching (TBLT) boosts Japanese EFL learners' communicative competence in English. Technology-based TBLT has recently attracted the attention of many EFL educators for the great potential of TBLT to be fitted integrally into the new language education and digital technology realities ([1]). Also, considering the fact that the new generation feels more comfortable communicating with people on an online platform, technology-mediated TBLT can effectively facilitate language learning for "digital natives" ([2]). In this study, Japanese university students enrolled in an English class ("Presentation Skills") participated in a class activity, which requires them to interview local business owners and work together to brainstorm the ways to globalize their business. The project was implemented and developed over 8 class meetings, consisting of 4 stages: 1) brainstorming phase with group members (3 students each) via Zoom, 2) visiting a local business owner or contacting them through emails to introduce the project, 3) visiting the local business owner and their company/store for an interview, and 4) presenting the result in English at a virtual conference. For each stage, a survey was conducted to examine students' perceived effectiveness of the project on their overall communicative competence in English. After the completion of the project, reflective writings were collected to further explore how their experience of working with other members on Zoom using English, brainstorming with real-life business owners, and presenting the result at a real academic conference (held online) in English led to the increased communicative competence in English.

LEARNER-CREATED DIGITAL ARTEFACTS: RAPID PRODUCTION AND INCREMENTAL IMPROVEMENT

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Keywords:
digital artefacts
materials development
online learning
learner-centric education

Flipped, blended and online learning frequently use tailormade multimodal materials, which require a considerable time and effort to create. This article describes a framework to optimize the production of digital artefacts by learners to help future cohorts. There are three advantages to this framework. First, the time-burden for the production of materials is shifted from the teacher and spread across the student participants. Second, learners are more motivated to create a tangible product with a real purpose rather than jumping through assessment hoops. Third, in order to teach content, learners must first understand the content. By setting assignments that require learners to analyze, evaluate and create materials enables learners to progress to the cognitively more demanding levels of Bloom's taxonomy and move along the knowledge dimension. Course assignments were written as product specifications for learners to produce digital artefacts, such as annotated texts, audio definition, and video explanations. Digital artefacts had a positive impact on student engagement and learning according to feedback from course tutors and learners. The incremental improvements to the online course materials were exponential since rather than one teacher developing materials for many students, the students developed materials. Student-created digital artefacts can be reused, repurposed, and revamped

DESIGN AND DEVELOPMENT OF A QUESTION GENERATOR FOR LEARNERS OF ENGLISH

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Keywords:
nlp
question generation
intelligent CALL

In this paper, we describe the design and development of the first release of an online question generator. This pedagogic tool enables learners of English to generate open-ended, closed-ended, and tag questions for a target sentence. Learners input a sentence (i.e. declarative statement) and select the type or types of questions to generate. Question generation is a non-trivial task involving numerous processes including syntactic transformation and pronoun selection. Syntactic transformation was achieved through the use of rules based on parse trees while the selection of interrogative pronouns was achieved using matching potential question foci with a linguistic knowledge encoded condition set. Lessons learned are detailed to help other researchers avoid or attempt to ameliorate the pitfalls and problems encountered in this study.

THE CHALLENGE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY IN EDUCATION

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Keywords:
education
ICT in education
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The dramatic impact of Information and Communications Technology (ICT) on society suggests the potential for an analogous effect on education. The prospects for some benefit from the affordances offered by ICT are appealing but not entirely understood by many educators. The challenges of design, implementation, assessment, and analysis of ICT-supported education are considerable. These challenges include how ICT can support traditional learning approaches, add new educational opportunities, and reduce resistance to introducing disruptive technologies such as smartphones. The affordances of ICT in education open many possibilities to integrate with and support existing curriculums. However, many educational institutions have not fully embraced these opportunities. This paper will explore some of the barriers to ICT adoption in the educational context. The first section is a brief introduction followed by a section on the history of educational theory to illustrate the considerable body of knowledge available on this topic. The third section introduces a type of case study of the challenges faced by a nation in providing the necessary infrastructure needed to implement many of these technologies. Section four gives a summary of many, but not all, barriers to technology adoption faced by educational administrators, instructional designers, educators, and learners. And the final section is a brief conclusion.

THE CHALLENGE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY IN EDUCATION

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Keywords:
Individualized Vocabulary Learning
Extensive Reading
Adaptive Learning

It is obvious that in order to learn a foreign language one needs to learn thousands of words. Without an adequate basis of vocabulary, students will not be able to understand well what their teachers explain, comprehend adequately what they read, and have oral communication productively. Moreover, with good knowledge of vocabulary, students can go further in mastering the language.

The primary requisites for significant foreign language acquisition of vocabulary mastery are massive comprehensible input. Among the ways to obtain comprehensible input, Extensive Reading (ER) has been believed to lead to greater vocabulary growth than to any program of explicit instruction alone beside the fact that ER itself is believed to be an effective way of improving reading skills. This individualized learning is believed to be effective and can be taken as one step toward an adaptive learning method, a computerized system of individual learning. This study was conducted with the aim to explore the implementation of embedding individualized vocabulary learning in an ER as one step toward the implementation of adaptive learning.

The case study was done with 30 respondents taking a reading course in tertiary education. Instruments of data collection were receptive and productive vocabulary tests, reading tests (TOEFL-like), a questionnaire, and a focus group discussion.

The individualized vocabulary learning was done as the follow-up activity of the extensive reading in which students freely selected reading materials of their own, collected 25 new words per week to be memorized and reported individually to the lecturer, and finally reported the reading to the lecturer.

Findings show the effectiveness of embedding individualized vocabulary learning into an extensive reading course in improving vocabulary mastery and reading skills. Students successfully improved their receptive vocabulary size from an averagely of 2466.12 to 2797.39 word-families, making an average gain of 331.27 word-families. Productive vocabulary mastery was also increased from 1018.31 to 1150.35, with an average improvement of 132.04 word-families. Secondly, students' reading skills also improved from the average of 56.54 to 65.

Students also showed good enthusiasm and motivation in doing all the given tasks. The course was considered interesting and motivating for the students although found hard to do. Simplified materials were considered appropriate for most students, especially the middle and lower groups; authentic texts such as newspaper articles were too difficult for most of the students but found more appropriate for smart students. This individualized learning would be more motivating and interesting when the materials are computerized systematically since students nowadays favour the use of high technology such as computers and internet.

RESEARCHING ONLINE COMMUNITIES OF INQUIRY THROUGH DIGITAL ETHNOGRAPHY

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Keywords:
Asynchronous
Discussion
Digital
Ethnography

Research into providing effective online education has suggested an important goal for instructors is the creation of an online community of inquiry (CoI) where social, cognitive, and teacher presence are all important aspects of successful online learning. With reference to a recent reflective practice case study, this paper describes ways that the research on online communities of inquiry may be enriched through the use of digital ethnography. In the target reflective case study, data analysis tasks were designed and presented in an online VoiceThread site, promoting dialogic and multimodal engagement with data from actual research studies that are central to the module theme in teacher education. Interaction around these tasks is coded using the CoI framework. Ethnographic data from the participants was collected and coded using qualitative research protocols to contextualise the interaction data and provide a clearer understanding of how participants had come together throughout the module. The ethnographic data revealed some interesting concerns with online learning, including the use of technology as a barrier to participation. Further, the place of distance and online platforms in these times of globalization and the marketization of educational processes was also raised.

APPLYING ADAPTIVE RECOGNITION OF THE LEARNER'S VOWEL SPACE TO ENGLISH PRONUNCIATION LEARNING BY NATIVE SPEAKERS OF JAPANESE

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Keywords:
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Discussion
Digital
Ethnography

When native speakers of Japanese are taught English as a second language, there are difficulties with their training in pronunciation of American English vowels that can be ameliorated though adaptive recognition of the learner's vowel space. This paper reports on the development of an online Computer-Assisted Language Learning (CALL) environment that provides Japanese learners with customized target utterances of 12 single-syllable words that are synthesized according to an adaptive recognition of the learner's vowel space. These customized target utterances provide each learner with examples of each of 12 American English monophthongs in consonant-vowel-consonant (CVC) context in order to sound as if they had been uttered by the learners themselves. This adaptive process achieved good results by giving more appropriate pronunciation targets to each learner, rather than forcing the learners to attempt to match the formant frequencies of their own utterances to those of the target utterances as produced by a talker exhibiting a different vowel space (i.e., one with a different vocal tract length).

UNDERSTANDING TECHNOLOGY: THE PHILOSOPHY OF THE FLYING FISH

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The rate of technological development has become so fast that we struggle to cope with, and to understand, the effects of the pervasive changes. In the late 1700s, corresponding to the beginning of the Industrial Revolution, the use of textile and threshing machinery, and other forms of automation, led to the loss of jobs in England.

Since the early 1800s, the positive promise and negative side-effects of various technologies have been identified and discussed in academic and popular literature. The changes emerging with technological development relate to all aspects of human life, including economic, political, cultural, computational, industrial, transport, medical, educational, and others.

While the humanities literature has considered the effects of technology, critiques tend to focus on effects rather than the characteristics of technology itself. Most philosophical literature since ancient times has either ignored an explicit consideration of technology or has interpreted the technical as something separate or different from the human. More recent commentators have interpreted technology either like Martin Heidegger, as something that might be avoided or used sparingly, or like Jacques Ellul, as something that might be escaped spiritually.

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Bernard Stiegler realized that our close relationship to technics results in an attitude of taking it for granted. He says that "[P]hilosophy consist[s] of considering the milieu while being able to extract oneself from it, in the same way as a flying fish can leave the water: intermittently" (Stiegler 2006, p. 14). Recognizing the need for a deeper understanding of modern technology, Bernard Stiegler wrote over twenty books comprising one of the most fundamental and comprehensive philosophies of technology.

His main work is the three-volume Technics and Time that interprets the human origin of technology and the relationship between human beings and technology, while revealing the practical effects of technology on culture, politics, and society. Relying in part on Gilbert Simondon's view that "culture ignores a human reality within technical reality" (Simondon 1958, p. 9), Stiegler explains how current technologies are extensions of human characteristics that were already evident before paleolithic humans. Evidence of this characteristic of early hominins began with stone tools and continued in cave painting and mechanical tools. He calls this intrinsic human quality originary technicity. Stiegler also considers the process of incremental adaptation of technical creations, which has led to modern industrialization. For example, symbol systems (pictograms), such as proto-cuneiform used for financial accounts in Mesopotamia in the 4th millennium BC, eventually became full writing systems. Also, some logographic scripts, such as Egyptian hieroglyphics, were transformed through the rebus principle to alphabets. Mechanical tools were refined and integrated into ensembles that evolved into machines. Stiegler refers to this ongoing process of technical refinement and change as grammatization. Further, he analyses the background and structure of problems that have developed during the evolution toward modern industrial societies. Technology is interpreted by Stiegler in terms of the classical Greek pharmakon, which accounts for all creative human activity as representing both a gain and a loss. For example, writing is a pharmakon; the gain is that written communications can be preserved and distributed on paper, thus being free from time and space constraints. However, the loss includes a decrease in personal memory, errors, and unoriginality in dialogue. However, Stiegler also understands that writing creates the conditions for the development of thought.

Stiegler elaborates this idea through the thought of Simondon (1958). Since the advent of machines, which are more complex than tools, "culture has made itself into a system of defense against technics, in which the defense is presented as a defense of humanity, supposing that technical objects do not contain human reality" (Simondon, 1958, p. 9). According to Stiegler (1998), to understand the machine and technics in general, it is necessary also "to know the place of the human in 'technical ensembles'" (p. 66). In order to understand the new relationship of the human to the technical that has developed since the Industrial Revolution, a new form of knowledge is required, based on the competence of the "technologist". (Stiegler 1998, p. 66)

My video presentation at ETLTC 2021 consisted of an introduction to Stiegler's thought that included originary technicity, grammatization, and the pharmakon (http://bit.ly/ETLTC2021-Brine-Plenary). Stiegler's call for a new form of knowledge based on that of the technologist would also have to include an understanding of Simondon, Heidegger, and Husserl. Future video presentations will review relevant concepts from those philosophies.

References

Simondon, G. (1958). Du mode d'existence des objets techniques. Paris: Aubier.
Stiegler, B. (1998). Technics and time: The fault of Epimetheus (Vol. 1). Stanford University Press.
Stiegler, B. (2008). Acting out (D. Barison, D. Ross, & P. Crogan, Trans.). Stanford University Press.

1 Stiegler's references to technology mean "the specific amalgamation of technics and the sciences in the modern period", while technics refers to "the technical domain or to technical practice as a whole" (Stiegler 1998, p. 280-281).

DESIGNING PROMOTIONAL VIDEOS FOR PROJECT-BASED LANGUAGE LEARNING: A CASE STUDY WITH SMART TOILETS

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Keywords:
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smart toilet
PBLL
movie
promotion video
Case study
Project-Based Language
Learning

This pilot project undertook an effort to understand how the pre-production plans on designing a promotional video in a project-based language learning classroom could be unveiled with undergraduate EFL computer science junior-level students. The central idea of the project was to explore the efficacy of digital storytelling as a method for developing professional communication skills in English. The specific case study chosen for the project was on intelligent toilets, and the pre-production movie design activities as assignments were designed in the syllabus as a community outreach effort in trying to promote awareness about intelligent toilets as a commercial product, and the necessity and benefits of intelligent toilets for consumers who might not be aware of it's reach. Assignments such as designing storyline and screenplay, print and video poster design, visual storyline with concept mapping, storyboarding and conference presentation design and delivery not only focused on understanding how students handle different design and analysis software, and technical documentation in a group setting, but also the extent to which they could successfully work with their team collaboratively, and in the process improve professional communication. The project could not explicitly and objectively measure the learning outcomes for professional communication, but it helped us explore the extent to which the group assignments requiring substantial group communication and coordination could be worked through successfully, and students' self-reported impression about the course materials, in general, and the working dynamics of the group. It's an established fact that successful group communication and coordination, and such group-based technical communication activities require multiple interactions, iterations and repeated and prolonged exposure. However, within the limited scope of this pilot project, the researchers could identify moderately successful efforts being made both for the assignments and in terms of the team effort.

EXTENDING SEMANTIC CONTEXT ANALYSIS USING MACHINE LEARNING SERVICES TO PROCESS UNSTRUCTURED DATA

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Keywords:
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machine learning
deep learning
IBM Watson

In the last decades, the primary focus of technical communication (TC) has been the system-assisted generation and utilization of standardized, structured, and classified content for dynamic output solutions. Intelligent content and use case-driven delivery in TC is achieved by modular content generation and semantic metadata application within component content management systems (CCMS).

Nowadays, machine learning (ML) approaches offer a new opportunity to integrate unstructured data into existing knowledge bases without the need to manually organize information into topic-based content enriched with semantic metadata. In situations where content is mostly available in unstructured formats, ML systems provide an alternative approach to migrate these kinds of data into a knowledge base by means of automated classifications, entity, relation, and metadata extractions.

To make the field of AI technologies more accessible for technical writers and content managers, a cloud-based machine learning as a service (MLaaS) solution provides a starting point for domain-specific ML modeling while unloading the modeling process from extensive coding, data processing, and storage demands. Therefore, information architects can focus on information extraction tasks and on ways to include pre-existing knowledge from other systems into the ML modeling process. Insights gained from the results of an ML analysis can be utilized to quickly classify new or unstructured content for delivery or management purposes or to provide support for other applications and processes, such as rule-writing and ontology modeling.

In this paper, the capability and performance of one such cloud-based MLaaS solution, IBM Watson, are analyzed to assess their value for semantic context analysis. The ML model is based on a supervised learning method and features deep learning (DL) and natural language processing (NLP) techniques to identify the predefined entity and relation types. The subject of the analysis is a corpus of scientific publications on the 2019 Coronavirus disease, focusing on information extractions regarding preventive measures and effects of the pandemic on healthcare workers. The domain model developed in IBM Watson Knowledge Studio (WKS) is deployed to IBM Watson Natural Language Understanding (WNLU) for a performance evaluation contrasting the analysis results of the custom model with IBM Watson's standard analysis ML model to attest the value of a custom-designed ML model for context analysis tasks.

IMPORTANCE OF TECHNICAL AND PROFESSIONAL WRITING CERTIFICATE IN A JAPANESE COMPUTER SCIENCE CONTEXT

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Keywords:
technical communication
design
curriculum
entrepreneurship
certificate

Technical communication (TC) as a subject, and more so a department in the university curriculum are few and far between in the Japanese educational context, even with STEM education. As part of this paper, an exploratory pilot study is described explaining the overall importance of such a TC certificate program and how an optional TC feeder course could help students understand the value of the TC and professional communication (PC) discipline for a typical Japanese computer science academic context, in preparation for the job market. Further, such a TC-focused introductory feeder course helps the university administration, students and teachers better understand how computer science as a discipline should also emphasize technical and professional writing and communication skills in the language curriculum, for better project management, and helping students develop soft skills for the market. Further, another strong argument for such coursework (offered in English as a medium of instruction) is also related to developing students' entrepreneurial and transition skills for the market. This paper highlighted one such rare certificate program and feeder course in computer science (CS) department of a Japanese technical university which helped students understand the scope of the market, how technical communication as a discipline has wide-ranging opportunities, besides helping students develop a basic understanding of content areas such as manual and information design, usability, content management and delivery, technical language, visualization, etc. Finally, the paper ends with a discussion of a few of the well-known TC certificate programs and TC organizational infrastructure in the US academia, and how we can catch up with that trend in Japanese higher education.

PROTOTYPING OF CREATION, IMPLEMENTATION AND VISUALIZATION OF CORRELATION RULES AND MICRODOCS

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Keywords:
Content Management
Systems
Content Delivery
Semantic Correlation Rules

Semantic Correlation Rules (SCR) and microDocs are new innovative concepts in the field of content delivery. SCRs allow to define relationships between information units based on their metadata and therefore, allow for the dynamic aggregation of microDocs.

The creation of SCRs heavily relies on the capabilities of modern content management systems (CMS) or ontology modeling software. The evaluation and visualization of the emerging microDocs, on the other hand, relies on the abilities of content delivery portals (CDP). At this time, the support of both concepts in most software solutions currently being used is only partly given.

To overcome the current technical restrictions, we have developed different prototypes and conceptional visuals to highlight the future possibilities that these new concepts will facilitate, and also to reveal problems in current systems or within the specification of SCR itself.

For the creation of SCR, we developed a web-based prototype as well as conceptional visuals. Their purpose is to demonstrate what creation methods for SCR may look like for CMS that do not support SCR yet. During the development of the prototype, we also analyzed certain aspects of the current specification and investigated on how SCR affect the microDocs when correlating a great number of topics. Based on the outcome of our analysis, we will propose a number of suggestions to improve the current specifications.

For the visualization of microDocs, we developed visual concepts for the representation in CDPs. With these visualizations we attempt to demonstrate the connection between the topics and their importance to the source topic in a informative, easy to understand and, last but not least, visually appealing way.

To explore the evaluation of SCR and to demonstrate the aggregation and visualization of microDocs, we prototyped a CDP utilizing a modern JavaScript front-end framework and an iiRDS-based content delivery API (headless CDP). The resulting application runs in the browser, it provides a simple user interface and consumes the server-sided iiRDS packages by calling API endpoints. This approach also allows us to implement and test-drive the afore-mentioned visualizations of microDocs in an interactive environment.

ONTOLOGY MODELLING AND STANDARDIZED INFORMATION EXCHANGE WITH CONTENT DELIVERY APPLICATIONS IN TECHNICAL COMMUNICATION

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Keywords:
technical communication
Component Content
Management System
CCMS
ontology
iiRDS
Content Delivery Portal
CDP
Semantic Correlation Rules
SCR

Ontologies are a technology recently used in technical communication to model information into a multidimensional net. Due to that, they expand the modelling by taxonomy of metadata in technical communication. Any kind of relation between multiple classes and entities can be established. These ontologies can be enhanced by Semantic Correlation Rules (SCR), which represent the connection between the metadata of the objects. SCR are used in connection with Component Content Management Systems (CCMS) and Content Delivery Portals (CDP) to deliver the appropriate amount of content in a more precise manner to the end user. Furthermore, they are used to simplify the workflow of the technical writers with helpful information like product knowledge and configuration.

In general, Ontology tools, CCMS and CDP are not based on the same ecosystem and therefore, they do not always work together effortlessly. Nevertheless, content from the CCMS and ontology systems can be used in combination to maximize efficiency and to deliver precise information to the user of the CDP. In order to achieve that, a standardized exchange format is helpful to connect varying tools offered by different providers. The intelligent information request and delivery standard (iiRDS) is an international standard for intelligent information request and delivery from tekom (tekom is the largest European Association for Technical Communication). iiRDS enables the workflow of information exchange between various systems. It provides a standardized set of metadata, which can also be expanded to integrate customized metadata. By matching customized metadata with the standardized iiRDS metadata, an information exchange between different systems is possible.

In this article, we are examining the information exchange between the above-mentioned systems and will evaluate the workflows in the domain of smart home. Ideally, information from CCMS can be used in CDP with the help of iiRDS. Furthermore, content can be published in a CDP with the option to be combined with SCR. SCR control which context is delivered to the user of the CDP. Through the SCR the content units are correlated with one another, which provides additional context instead of a single unit. Simultaneously, unnecessary context is being avoided by not delivering an entire manual to the user. The paper also aims to investigate modelled SCR in CDP implementations.

SEMANTIC CORRELATION RULES AS A LOGIC LAYER BETWEEN CONTENT MANAGEMENT AND CONTENT DELIVERY

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Semantic technologies have recently gained considerable influence and attention in the field of technical communication and information management. While metadata management is already a well-known field of content management technologies, its semantic extension addresses more recently, for example, problems of model-based product development and related content engineering processes. On the other hand, dynamic search technology and content delivery can benefit from semantic modelling by enhancing search functionalities or by integrating various data sources utilizing semantic mapping. In this evolving environment, we propose a logical layer of content correlations as so-called semantic correlation rules (SCR). This layer can be understood as an interface between content management systems, semantic modelling systems and content delivery portals. Semantic correlation rules serve as a light-weight ontology consisting primarily of untyped semantic relations between metadata classes. In doing so, class-to-class linking mechanisms can be implemented in content delivery and search environments while serving as a basis for the previously introduced microDoc concept.

Keywords:
Technical Communication
Content Management
Content Delivery
Semantic Modelling
MicroDocs
Correlation Rules

CREATING CONTENT AND USE CASES FOR TESTING SEMANTIC CORRELATION RULES IN CONTENT DELIVERY

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Keywords:
Semantic Correlation Rules
Content Delivery
Ontology
Content Management System

A common problem of Content Delivery Portals (CDP) is that selected content modules are presented without any context. A possible solution to consider concerning this issue is the concept of microDocs, a set of topics, which are connected by logical context. An approach for the implementation of microDocs are Semantic Correlation Rules (SCR). These rules in the standardized SCR format enhances content delivery concepts to create an even more intelligent content.

A necessary precondition for the use of SCR is an existing metadata architecture or an additional semantic model such as an ontology, that can be interpreted semantically. The goal of our study is to examine the realization of SCR in CDP according to use cases. We gathered content in the field of smart homes and collected content of different information types such as PDFs, HTML documents and videos. The classification of these documents enabled the development of modular content, which could be transferred into a Content Management System (CMS). Thereby, creating links manually becomes unnecessary, because the SCR allow to correlate the content logically and independent of specific systems.

To be able to examine further systems with additional semantic models, the development of an ontology is the appropriate approach. The developed ontology is the result of the knowledge gained from the collected data, additionally, it enables the establishment of a metadata architecture, which can be implemented in a CMS. The CDP work with different concepts for the presentation of intelligent content. The examination also considered systems with various levels of SCR integration and development. In order to compare several CDP implementations, there is a need to develop test cases. These allow to evaluate how the different CDP use SCR. The comparison of the test results have shown the behavior of the CDP after implementation.

CONTRASTING ONTOLOGY MODELING WITH CORRELATION RULES FOR DELIVERY APPLICATIONS

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Keywords:
ontology
semantic correlation rules
use-cases

With the increasing importance of knowledge management, variant management and the ever-growing quantity of data, ontologies emerged as a form of knowledge representation, especially in the field of technical communication for modelling metadata and to create correlations between them. In the area of delivery applications, the deliverable information objects receive a certain intelligence by semantic metadata. It is expected that ontologies offer a higher level of intelligence which could lead to an improvement in classification, connection and delivery possibilities of content.

On the contrary creating those complex ontologies requires a great time effort. Thus, the question arises whether their use offer a decisive added benefit or if alternatives such as untyped correlations should be preferred. In that case the concept of semantic correlation rules may pose an opportunity to derive advantages from ontologies: By defining, which classifications are connected to others, it is possible to present content tailored to user-specific information requirements.

By developing use cases we aim to evaluate the required level of intelligence of the metadata resulting from its modeling method to achieve this goal. Additionally, the richness of the semantic metadata modeling determines the possibilities of the logical accuracy of the content. Therefore, an ontology in the domain of smart homes has been created to be the foundation of further research. On the one hand, this ontology is being used to extract semantically rich metadata. On the other hand, it is being used to link related content. The research depicts if, depending on the use case, ontologies are required for dynamic user-specific information delivery, or if the same result can be achieved by using a less complex solution like SCR. For this purpose, the implementation of SCR has been tested in different software tools. While some of the software tools support ontology formats, others do not. In some extent, the results will also show in which use cases ontology modeling could be suitable to comply with user-specific information requirements.

LINGUISTIC APPROACH TO SEMANTIC CORRELATION RULES

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Keywords:
Natural Language Processing
Semantic Correlation Rules
Indexation

The communication between humans and machines is essential, mostly in the area of processing of natural language, for example, using speech recognition, searches, and so on. Even if more people learn how to input instructions, communicating in a natural language still seems key, especially for end users.

Natural language can be classified and interpreted, for example, with Natural Language Processing (NLP). NLP, as a technology, uses the detection of intents and entities. Some NLP methods do not go far beyond an indexation of content. Therefore, in this paper, indexation is considered as a very simple linguistic approach. Semantic correlation rules offer the possibility to connect indexation with simple ontological methods by using a set of predefined rules. In doing so, this paper aims to examine alternative ways of interpreting indexation to extend the understanding of natural language and to possibly extend NLP methods.

First, an ontology is enhanced with indexation and linguistic relations. Then, relations are queried with semantic correlation rules and exported into a Content Delivery Portal. In the Content Delivery Portal, indexation and linguistic relations are displayed and tested. Subsequently, it is examined in what way semantic correlation rules can help to interpret natural language.

"DIGITAL TRANSFORMATION OF COMMUNICATIONS" FROM THE VIEWPOINT OF THE USEFULNESS OF INFORMATION

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Overview
The new normal which we faced in 2020 is urging us to transform from face-to-face and physical media-based communications styles to non-face-to-face and contactless communications styles. In this course, I shall outline the digital transformations of communications based upon the perspective of utilizing AI for the purpose of enhancing the usefulness of information.

Communication styles have been transformed
First of all, there are the behavioral changes in the information users. The opportunities for information users to come into contact with Internet media are increasing more than before, and oral communications whereby video calls are being used are becoming commonplace. Another thing is that there are changes in information transmission and collection methods. The application of Internet media has been a hot topic from before, but in the new normal, information gathering and communications whereby social media are being used are becoming commonplace. Communications styles are influenced by the characteristics of the media which are used. The medium of documents is a medium which presupposes one-way traffic from the creators to the readers. Social media are media which presuppose bidirectionality. If the information gathering and communications which use social media become commonplace, then through online usage, bidirectional communications styles are going to be shifted to.

Enhancing the usefulness of information
What is going to be lost by the influence of the transformations will be the usefulness of information which is designed and created in advance by the information creators from the creators' perspectives. A typical example is documents. The roles of documents are going to converge on contract fulfilling and record keeping. First of all, digital communications designing should be commenced.
Usefulness can be expressed to be a formula whereas the denominator is work x costs, and relevance x validity x interactivity x timeliness x understandability are the numerator. In going back to the headstream of the contents and the essences that we want to convey, and in reframing the basis of the values of the information which has been provided, mindsets are being sought which match the methods that are providing those values to the times and causing them to evolve. In the communications in the new normal, the enhancing of validity and timeliness to obtain understanding and empathy are being sought after.

"DIGITAL TRANSFORMATION OF COMMUNICATIONS" FROM THE VIEWPOINT OF THE USEFULNESS OF INFORMATION

Applying AI in communications

In the new normal, the liberating of information from the constraints of places, times, and things will become valuable. In order to provide valuable information, the collecting, and analyzing of data which searches for the way that information should be that the information users are seeking, needs to pursue how to have the information be conveyed, and how to have it be used. The comparing of data which the AI that utilizes neural network technologies is good at performing, it is utilized in the matching of the structures of created information and the structures of the information that the information users are seeking. It is digital communications that shoulders the roles of bridging the spans in between the information creators and the information users on AI.

MONTESSORI PROJECT

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Keywords:
Neuroarchitecture
Sustainability
Universal design
Community
Architectural skin
Responsive skin

The architectural character of a building is based on different aspects. In order to understand the spirit of each building, we must study functional, associated and personal elements of it. Each architectural element differs in each aspect since each one is based on previous analysis and studies to be able to emerge and reach its purpose.

The Montessori architectural project is based on research on the method of this system that provides environments prepared for the proper development of children in education. The classrooms, materiality, socialization, environments and spaces are studied in order to be able to generate and gradually form design ideas to generate the project in a successful way.

It is decided based on the information obtained by previous studies, to use the neuroarchitecture design guideline to be able to meet the guidelines and objectives of this Montessori method, since this guiding concept goes beyond the study of space, but involves the emotions and feelings of the people who live the spaces. In this way, it is better understood that what guides us to the architectural design of the proposal based on the Montessori method are the studies of neuroarchitecture.

HOW USING SMART BUILDINGS TECHNOLOGY CAN IMPROVE INDOOR ENVIRONMENTAL QUALITY IN EDUCATIONAL BUILDINGS

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Keywords:
Smart buildings
Responsive skin
Indoor environmental quality
Environmentally oriented technology
Bioarchitecture

An educational building must integrate smart building strategies to ensure indoor environmental quality. Thermal, acoustic, visual comfort and indoor air quality are to be considered, otherwise they can develop the sick building syndrome. Smart buildings solve this potential problem by providing a highly efficient living ambience that includes safety, comfort and a good quality of living/learning/working experience, that helps the users achieve their best possible performance. These buildings should integrate advanced technologies such as automated systems and the implementation of architectural skins, well and functional designed spaces and architectural features that act as active bioclimatic solutions. The following is a case study of an architectural project for an elementary and junior high school academic campus in the state of Nuevo León, Mexico that has to deal with the extreme climate conditions of the location, while applying the best alternative and bioclimatic strategies through the implementation of inmotics, a responsive architectural skin, sustainable construction systems and native vegetation. In doing so, a comprehensive environmentally friendly building is created, taking advantage of the surrounding natural conditions, using the latest environmentally oriented systems and technologies. The result is a healthy, safe, and productive space for its users that greatly benefits the teaching-learning process.

BIOCLIMATIC ARCHITECTURE

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We are living through serious problems of environmental pollution, which causes great risks to the well-being of the population. These problems are presented by the bad planning of urban growth, and many times in very bad quality. Industrialization grows in the cities without having an order and an appropriate planning to avoid the damage in our environment. The construction sector is largely responsible for this global pollution that is experienced today. As the years go by, architects aim to improve the quality of their construction and improve our quality of life. New projects arise with strategy and planning, developing a new type of architecture which contemplates the damage it would do to the environment and how this issue could be solved based on its construction development. The profession of architects, or urban planners who are involved in the development of cities, are responsible for creating new developments by designing the impact of climate change. The architectural community carries a great responsibility in designing with the flows of materials, energy, climate change, causes and solutions in mind.Architecture must involve sustainability in its construction process and know how to implement it to cause an environmental impact to satisfy the common welfare.

Keywords:
Bio architecture
Architectural skin
Climate change
Sustainable design
Responsive skin

THE APPLICATION OF BIOMIMETICS AND ARCHITECTURAL SKIN AS A SUSTAINABLE STRATEGY

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The relationship between biomimetics as a design strategy and architectural skin as a construction technique, both of these strategies can be implemented in a building design process to develop more sustainable project, now a days there is a pollution problem in Mexico and one of the main causes is the waste generated by construction, in addition, just a few investors are interested in the application of bioclimatic strategies, sustainable technologies and building materials because they imply a large investment and constant maintenance, which is why an architectural skin designed based on the responsive skin of the crocodile is proposed, which is expected to be seen as a model for future generations of Mexican architects for them to implement these strategies and methodologies in their design process.

Keywords:
Biomimetics
Architectural responsive skin
Sustainable design
Sustainable building materials

ARCHITECTURAL DESIGN APPROACH FOR MORPHING SMART CITIES IN MEXICO

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This academic work aims to provide an intricate definition of the terms at hand as well as explain the relationship between smart cities and the sustainable development that they present based on a comparative analysis of case studies and experiences in the Mexican context. The endeavour to achieve being an architectural proposal of an innovative solution adapted to current conditions that will be carried out by an academic team, thus incorporating sustainable criteria, universal accessibility and social inclusion. This research work reflects the theoretical aspect, providing an intricate academic reflection and giving background information also establishing the complexity that lies within Latin American metropolis emphasizing in Mexican cities, as to provide insight into the academic dynamics in order to educate professionals on the field from an updated perspective in which they´ll be able to determine and analyse the implementation of smart cities from an architectural standpoint and the impact they would have on the quality of urban life in those Mexican cities.

Keywords:
smart cities
Mexican cities
architectural design
architecture

A CONTEMPORARY MACHINE LEARNING METHOD FOR ACCURATE PREDICTION OF CERVICAL CANCER

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Keywords:
Cervical Cancer
Machine Learning
Decision Tree
Sensitivity
Specificity
Accuracy

With the advent of new technologies in the medical field, huge amounts of cancerous data have been collected and are readily accessible to the medical research community. Over the years, researchers have employed advanced data mining and machine learning techniques to develop better models that can analyze datasets to extract the conceived patterns, ideas, and hidden knowledge. The mined information can be used as a support in decision-making for diagnostic processes. These techniques, while being able to predict future outcomes of certain diseases effectively, can discover and identify patterns and relationships between them from complex datasets. In this research, a predictive model for predicting the outcome of patients' cervical cancer results has been developed, given risk patterns from individual medical records and preliminary screening tests. This work presents a Decision tree (DT) classification algorithm and shows the advantage of feature selection approaches in the prediction of cervical cancer using recursive feature elimination technique for dimensionality reduction for improving the accuracy, sensitivity, and specificity of the model. The dataset employed here suffers from missing values and is highly imbalanced. Therefore, a combination of under and oversampling techniques called SMOTETomek was employed. A comparative analysis of the proposed model has been performed to show the effectiveness of feature selection and class imbalance based on the classifier's accuracy, sensitivity, and specificity. The DT with the selected features and SMOTETomek has better results with an accuracy of 98%, sensitivity of 100%, and specificity of 97%. Decision Tree classifier is shown to have excellent performance in handling classification assignments when the features are reduced, and the problem of imbalance class is addressed.

SYNCHRONIZING WINDSHIELD WIPERS WITH SOUND ENTERTAINMENT SYSTEM INSIDE VEHICLES

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beat detection
mechatronic interface
visual music

With the advent of new technologies in the medical field, huge amounts of cancerous data have been collected and are readily accessible to the medical research community. Over the years, researchers have employed advanced data mining and machine learning techniques to develop better models that can analyze datasets to extract the conceived patterns, ideas, and hidden knowledge. The mined information can be used as a support in decision-making for diagnostic processes. These techniques, while being able to predict future outcomes of certain diseases effectively, can discover and identify patterns and relationships between them from complex datasets. In this research, a predictive model for predicting the outcome of patients' cervical cancer results has been developed, given risk patterns from individual medical records and preliminary screening tests. This work presents a Decision tree (DT) classification algorithm and shows the advantage of feature selection approaches in the prediction of cervical cancer using recursive feature elimination technique for dimensionality reduction for improving the accuracy, sensitivity, and specificity of the model. The dataset employed here suffers from missing values and is highly imbalanced. Therefore, a combination of under and oversampling techniques called SMOTETomek was employed. A comparative analysis of the proposed model has been performed to show the effectiveness of feature selection and class imbalance based on the classifier's accuracy, sensitivity, and specificity. The DT with the selected features and SMOTETomek has better results with an accuracy of 98%, sensitivity of 100%, and specificity of 97%. Decision Tree classifier is shown to have excellent performance in handling classification assignments when the features are reduced, and the problem of imbalance class is addressed.

ADOPTING STUDYINTONATION CAPT TOOLS TO TONAL LANGUAGES THROUGH THE EXAMPLE OF VIETNAMESE

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Keywords:
CAPT
Vietnamese
Prosody
Tonal language

With the advent of new technologies in the medical field, huge amounts of cancerous data have been collected and are readily accessible to the medical research community. Over the years, researchers have employed advanced data mining and machine learning techniques to develop better models that can analyze datasets to extract the conceived patterns, ideas, and hidden knowledge. The mined information can be used as a support in decision-making for diagnostic processes. These techniques, while being able to predict future outcomes of certain diseases effectively, can discover and identify patterns and relationships between them from complex datasets. In this research, a predictive model for predicting the outcome of patients' cervical cancer results has been developed, given risk patterns from individual medical records and preliminary screening tests. This work presents a Decision tree (DT) classification algorithm and shows the advantage of feature selection approaches in the prediction of cervical cancer using recursive feature elimination technique for dimensionality reduction for improving the accuracy, sensitivity, and specificity of the model. The dataset employed here suffers from missing values and is highly imbalanced. Therefore, a combination of under and oversampling techniques called SMOTETomek was employed. A comparative analysis of the proposed model has been performed to show the effectiveness of feature selection and class imbalance based on the classifier's accuracy, sensitivity, and specificity. The DT with the selected features and SMOTETomek has better results with an accuracy of 98%, sensitivity of 100%, and specificity of 97%. Decision Tree classifier is shown to have excellent performance in handling classification assignments when the features are reduced, and the problem of imbalance class is addressed.

LOSSLESS TEXT COMPRESSION USING GPT-2 LANGUAGE MODEL AND HUFFMAN CODING

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Keywords:
Text compression
Gzip
Bzip2
LZMA
Brotli
compression ratio

Modern daily life activities produced lots of information for the advancement of telecommunication, and it is a challenging issue to store them on a digital device or transmit it over the Internet that leads to the necessity for data compression. Thus, research on data compression to solve the issue has become a topic of great interest to researchers. Moreover, the size of compressed data is generally smaller than its original. As a result, data compression saves storage and increases transmission speed. In this article, we propose a text compression technique using GPT-2 language model and Huffman coding. In this proposed method, Burrows–Wheeler transform and a list of keys are used to reduce the length of the original text file. Finally, we apply GPT-2 language mode and then Huffman coding for encoding. This proposed method is compared with the state-of-the-art techniques used for text compression. Finally, we show that the proposed method demonstrates a gain in compression ratio compared to the other state-of-the-art methods.

RAYTRACING RENDER SWITCHER WITH EMBREE

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Keywords:
computer graphics
raytracing
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rendering equation
global illumination
embree

We introduce a way of implementing physically-based renderers that can switch rendering methods with a library, Embree. Various physically-based rendering (PBR) methods can generate beautiful images that are close to the human view in the real world. However, a comparison between corresponding pairs of pixels of image pairs generated by different rendering methods is necessary to verify whether the implementation correctly obeys mathematical models of PBR. For comparison, result images must be the same scene, same resolution, from the same camera angle. We explain the fundamental theory of PBR first, and present an overview of a library for PBR, Embree, developed by Intel, as a way of rendering-switchable implementation. Finally, we demonstrate computing result images by a renderer we developed. The renderer can switch rendering methods and be extended for other method implementations.

ANIMATED COLOR CUBE

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The RGB color model is framed by black, white, three additive primary colors, and three subtractive secondary colors, but there are many hues between them. We used the color cube for representing dimensional bases and intermediate hues and animated it to visualize color interpolation process.

Keywords:
color mixture
color model
color space
color cube
auralization

REDIRECTED WALKING FOR VIRTUALLY EXPANDED PLAY AREA

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We describe a method of achieving redirected walking by applying manipulations to the amount of subjective movement and rotation. In the real space, the user walks around without leaving the 5m square space, but in the virtual space, we have built a system that allows it to move around a larger area than that in the real space. This system is realized by moving and rotating the ground in response to the subject's movements.

Keywords:
Virtual Reality
Redirected walking
Translational manipulation
Rotational manipulation

A BOARD GAME PROPOSAL FOR TEACHING INFORMATICS RELATED TOPICS IN EARLY CHILDHOOD EDUCATION.

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This paper presents an idea of a board game designed for teaching informatics-related topics to kindergarteners, as part of an undergraduate thesis. The idea emerged through a course about game-based learning and popular board game ideas were examined. Based on a brainstorming session, the appropriate format of the board was selected. Then, the topics were selected, addressing the issue of internet use by young children. The subtopics identified were that of safety while accessing the internet, proper computer use, technological matters, and functional potential (all explained in detail in the paper). The game idea, mechanics, and design are presented in this paper.

Keywords:
Early Childhood Education
Board game
Game-based Learning
Informatics

SPEAK WITH SIGNS: ACTIVE LEARNING PLATFORM FOR GREEK SIGN LANGUAGE, ENGLISH SIGN LANGUAGE, AND THEIR TRANSLATION

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Sign Language
Deaf
Greek Sign Language
English Sign Language
Learning
Interaction
Active Learning
Open Source software

Sign Language is used to facilitate the communication between Deaf and non-Deaf people. It uses signs-words with basic structural elements such as handshape, parts of face, body or space, and the orientation of the fingers-palm. Sign Languages vary from people to people and from country to country and evolve as spoken languages. In the current study, an application that aims at Greek Sign Language and English Sign Language learning by hard of hearing people and talking people has been developed. The application includes grouped signs in alphabetical order. The user can find Greek Sign Language signs, English sign language signs and translate from Greek sign language to English sign language. The written word of each sign and the corresponding meaning is displayed. In addition, the sound is activated in order to enable users with partial hearing loss to hear the pronunciation of each word. The user is also provided with various tasks in order to enable interaction of the knowledge acquired by the user. This interaction is offered mainly by multiple-choice tasks, incorporating text or video. The current application is not a simple sign language dictionary as it provides the interactive participation of users. It is a platform for Greek and English sign language active learning.

LEARNING STYLE INDEX: ANALYSIS AND SMARTPHONE-BASED IMPLEMENTATION

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Recently, the remote system is collecting a lot of attention due to the outbreak of infectious disease. Especially in the education field, many instructors must deliver a lecture through the internet. However, many differences in mutual understanding often occur. In this research, we propose a mobile application to analyze learning styles for individual learners. It provides students to identify their best learning style and an efficient learning method. It also helps teachers to make suitable lecture materials by indicating the learning tendencies of their class.

Keywords:
mobile learning
iOS development
learning style index
learning preferences

AUGMENTED REALITY FOR WINE INDUSTRY: PAST, PRESENT, AND FUTURE

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In this paper, we study the concepts, materials, tools, and applications that constitute what we call augmented reality (AR) for the wine industry. A comprehensive review of what are the basic multimedia content for constructing successful AR applications for wine products is given. To this end, we provide a detailed analysis of how AR technology is used to create augmented "live" wine labels, and how digital storytelling has revolutionized wine products marketing. Also, we describe the use of AR technology to promote winemaking companies to influence consumer preferences. Finally, we report the characteristics of future research directions and some open issues and challenges on using AR for wine product promotion.

Keywords:
Augmented Reality
Wine Marketing
Digital Storytelling

OUTDOOR NAVIGATION SYSTEM BY AR

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Map apps such as Google Maps often don't provide detailed information about areas such as amusement parks and university campuses. In addition, there are some people who cannot reach their destination just by reading a flat map. Therefore, in this research, we have developed an AR (Augmented Reality) navigation application for facilities to solve these problems. In addition, by using the Kalman filter to estimate the user's position, we were able to improve the accuracy of displaying AR objects.

Keywords:
AR
navigation
Facility way-finding

COLLABORATIVE LEARNING ALGORITHM IMPLEMENTATION FOR COVID-19 DIAGNOSIS TOWARDS AN AI-ENABLED REAL-TIME BIOMEDICAL SYSTEM (AIRBIS)

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In this paper, we propose a Collaborative Learning Algorithm for AI-Enabled Real-time Biomedical System (AIRBiS), where a convolution neural network is deployed for pneumonia (i.e., COVID-19) image classification. With augmentation operation, the federated learning (FL) approach achieves a high accuracy of 95.09%, which outperforms the conventional learning approach with an accuracy of 94.08%. Besides, using multiple edge devices reduces overall training time. Thanks to the collaborative platform, the medical data's decentralized characteristics and privacy concerns are well addressed.

Keywords:
Collaborative Learning
Biomedical System
Neural Networks
Artificial Intelligence
Data Privacy

A COMPREHENSIVE SOFTWARE STUDY ON CLASSIFICATION OF COVID-19 WITH DEEP CONVOLUTION NEURAL NETWORKS

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Artificial Intelligence (AI) has recently become a topic of study in different applications including healthcare, in which timely detection of anomalies can play a vital role in patient's health monitoring. The COVID-19 disease, caused by the SARS-CoV-2 virus, colloquially known as the Coronavirus, is disrupting large parts of the world. The standard way to test for COVID-19 is Reverse Transcription Polymerase Chain Reaction (RT-PCR) which uses collected samples from patients. This paper presents an efficient convolution neural network software implementation for COVID-19 and other pneumonia disease detection targeted for an AI-enabled smart biomedical diagnosis system (AIRBiS). From the evaluation results, we found that the classification accuracy of the abnormal (COVID-19 and pneumonia) test dataset is over 97.18%. On the other hand, the accuracy of the normal is no more than 71.37%. We discussed the possible problems and proposals for further optimization.

Keywords:
Pneumonia Detection
COVID-19
CNN
Bio-system
Dataset Pre-processing

TEACHING YOUNG LEARNERS A FOREIGN LANGUAGE VIA TANGIBLE AND GRAPHICAL USER INTERFACES

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Keywords:
Tangible interfaces
Graphical User Interfaces
Interaction
Learning
Open Source software

The use of tangible interfaces in teaching has been proved more effective, user-friendly, and helpful in collaborative learning departments when compared to traditional teaching approaches. In particular, the tangible interface "Makey Makey" is a modern tool that enhances collaboration between pupils, with positive
results in education, despite the limited research done on this interface so far. "Makey Makey" succeeds in motivating and engaging young learners in the learning process, showing better performance and scoring results. In addition, its use in teaching has been shown to benefit the learning process in every age learning group. The development and use of such an innovative teaching/learning approach help young learners perceive the educational process in a different way and assimilate new cognitive fields more effectively. Moreover, educators
profit as well, as they can eliminate difficulties and teach more efficiently using examples based on their teaching approach while enhancing young learners' parallel skills as well. This study will confirm previous research results stating that assimilation of new concepts is easier with tangible interfaces than with graphical ones, as well as that young learner participating in the survey have shown significant progress in knowledge acquisition when compared to their prior knowledge.

A GENERATOR TOOL FOR CARRY LOOK-AHEAD ADDERS (CLA)

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A carry look-ahead adder (CLA) is a digital circuit that is used widely used in any electronic computational device to improve speed calculation by reducing the time required to define carry bits. Despite the fact that CLA is used massively in modern digital systems, there is no online tool to automatically generate the HDL description. For this reason, we developed a cloud-based tool to automate the design of optimized CLA and provide custom test benches to verify their correctness for singed and unsigned numbers. It is also can be used by the students to create and understand deeply the way CLA works.

Keywords:
carry look ahead adder
CLA
HDL generation

UTILIZING ROBOTICS FOR LEARNING ENGLISH AS A FOREIGN LANGUAGE

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In recent years, Information and communications technology (ICT) has become a fundamental element of almost all aspects of formal and nonformal education. Educational Robotics (ER) as an ICT subfield has triggered many studies of ER educational utilization as the training of a new foreign language. This paper aims at highlighting another perspective of knowledge, utilizing the ER for learning English as a Foreign Language (EFL). It presents educational scenarios explaining how the robot can be involved in the learning process.

Keywords:
robot
edu-robot
education
foreign language

ENVISIONING IOT APPLICATIONS IN A SMART CITY TO UNDERPIN AN EFFECTIVE MUNICIPAL STRATEGY: THE SMARTBIN PROJECT

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Due to the Earth's population's rapid growth and the modern lifestyle, the urban waste creation rate constantly increases. Organic waste, which forms a significant part of municipal solid waste, has caused increasing environmental concerns. Recycling is the only way to make a sustainable environment. According to estimations from the United States Environmental Protection Agency, around 24 percent of the total waste can be composted. Instead, most of it is land-filled and incinerated. By composting organic waste, we can preserve resources and produce a valuable by-product that can be used as a locally produced fertilizer. In this paper, we propose a solution: a low-cost and effective Smart Compost Bin that utilizes modern technologies, such as environmental sensors and the LoRaWAN protocol to assist with the composting process. A centralized Information System collects measurements from smart bins that can be deployed anywhere and can further assist with the waste collection process. We have performed several experiments with our smart bin prototype, evaluated its efficiency, and concluded that it is a feasible solution.

HARDWARE ACCELERATION OF CONVOLUTION NEURAL NETWORK FOR AI-ENABLED REAL-TIME BIOMEDICAL SYSTEM

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COVID-19 is currently on the rage all over the world and has become a pandemic. To efficiently handle it, accurate diagnosis and prompt reporting are essential. The AI-Enabled Real-time Biomedical System (AIRBiS) research project aims to develop a system that handles diagnosis using chest X-ray images. The project is divided into UI, network, software, and hardware. This work focuses on the hardware, which uses CNN technology to create a model that determines the presence of pneumonia. This CNN model is designed on an FPGA to speed up diagnostic results. The FPGA increases the flexibility of circuit design. The flexibility of the FPGA allows us to optimize the computational processing during data transfer and CNN implementation, reducing the diagnostic measurement time for a single image.

Keywords:
Hardware acceleration
CNN
COVID-19
FPGA
Networks-on-chip

REAL-TIME HAND-GESTURE RECOGNITION BASED ON DEEP NEURAL NETWORK

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Hand gestures are a form of non-verbal communication used by individuals in conjunction with speech to communicate. Nowadays, with the increasing use of technology, hand-gesture recognition is considered to be an essential aspect of Human-Machine Interaction (HMI), allowing the machine to capture and interpret the user's intent and respond accordingly. Hand-gesture recognition is a crucial task in medical settings such as prosthetic control. We developed a real-time hand gesture recognition system using a deep neural network as the first step for the research in which a person uses a prosthetic hand with an EEG signal from the arm. The system which we proposed was able to recognize hand signs with an accuracy of 96.6%.

Keywords:
Deep Neural Network
Hand-Gesture Recognition
Human-Machine Interaction
real-time recognition
EEG

TOWARDS DEVELOPING A TELEOPERATION SYSTEM FOR A DISASTER RESPONSE ROBOT

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Keywords:
Disaster Response Robot
Teleoperation System
World Robot Summit

Standard Disaster Robotics Challenge of World Robot Summit (WRS) aims to test the ability of robots that can be used as disaster response robots. Robot Engineering Lab (REL) of the University of Aizu is developing a robotic system to address the above robotic challenge. This paper contains a brief overview of a robotic system and the technologies that were used by the REL and how students had to organize to control and build such a system. The competition has five stages and the teleoperation robotic system had to be developed to satisfy the requirements of each challenge. REL uses a disaster-response robot called Giraffe which has the capability of traveling in hard terrain. Open Robot Technology Middlewear (OpenRTM) uses to integrate all of the subsystems inside the robot. Each sub-system has different tasks that process video data, RGB depth data, point cloud data (PCD), sensor data and, feedback data. The Robotic system includes 6 cameras and NDI Software Developer Kit (SDK) used to transmit and view video stream teleoperationally. Video stream from each camera can be viewed separately and it gives wider control over the robot for the operator. The teleoperation robotic system was tested during a robot demonstration held in Fukushima Robot Test Field and results were analyzed according to the WRS 2018 guidelines. The results were at an acceptable level.

A MODEL FOR CLASSIFYING COMMON ERRORS IN COMPLEX TEXTS

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Keywords:
e-learning
programming education
solution codes
classification
errors

In recent years, the importance of e-learning has increased significantly worldwide. Among all the subjects, programming education has drawn special attention because of its importance for continuous development in the ICT sector. Finding mistakes in a complex text (program code) is a laborious task for both students and instructors. Students are spending a lot of valuable time searching for errors in the solution codes. In this paper, a model for classifying mistakes in a solution code is presented. In the proposed model, the differences between wrong solutions and corrected solutions are used to define feature vectors for a clustering algorithm. A longest common subsequence (LCS) algorithm has used to find the differences between wrong and corrected codes, then all the inequalities are converted into feature vectors. The K-mean clustering algorithm is applied to cluster the elements of the feature vector to find the most common errors in solution codes. In our experiment, the model was applied to a set of program texts accumulated in an e-learning system. Experimental results show that the proposed model is efficient and capable to identify the most common errors that occurred in solution codes that can be useful for students and instructors to resolve errors quickly.

LARGE AREA INSPECTION USING 3D POINT CLOUD DATA IN A DISASTER RESPONSE ROBOT

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Keywords:
Disaster Response Robot
World Robot Summit
3D Point Cloud Data

Large area inspection using a robot is critical in a disastrous situation. Especially when a disastrous environment is inhabited by humans. These kinds of robots were actively used to inspect inside the power plants when Fukushima Daiichi and Chernobyl nuclear disasters happened. In this research, we are building a robotic system for Large Area Inspection, aiming World Robot Summit (WRS) Standard Disaster Robotics Challenge, Task EXP1 Large area Inspection. Spider2020, a robotic system designed by the Robot Engineering Laboratory (REL), University of Aizu was used in this research. Detecting QR codes in a wall and Merge Point Cloud Data and then generate a map of a wall are two main tasks of task Exp1. Separate algorithms and software were developed for the above tasks. For detecting and decoding QR codes Zxing library was used and the results were quite accurate. On the other hand accuracy of merging Point Cloud Data can be improved by including the position of PCD files in the merging algorithm. The robotic system can be used for large area inspection in a disastrous situation.

TEAM ACTIVITY OF ROBOT COMPETITION OF SIMULATED ROBOT IN WORLD ROBOT SUMMIT 2020

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Keywords:
WRS
Robot
choreonoid

World Robot Summit (WRS) has several robot competitions, and we will participate in the infrastructure and disaster response category. Participating teams develop their robot system by teleoperation and/or autonomous operation and run it in a set of courses modelling and simplifying disaster responding situations. The authors will attend the challenge of the tunnel disaster response and recovery, in which we are requested to achieve an investigation and rescue scenario of a tunnel fire with simulated robots.

As preparation, we develop simulated robot models and corresponding software as a team. In this article, we report our activity to the robot competition and student's project-based learning by joining it.

WEST AFRICAN POLYRHYTHM: CULTURE, THEORY, AND GRAPHICAL REPRESENTATION

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Keywords:
Polyrhythm
Polymeter
West Africa
Ethnomusicology
Notation

In this paper I explicate polyrhythm in the context of traditional West African music, framing it within a more general theory of polyrhythm and polymeter, then compare three approaches for representing polyrhythm in a graphical notation. In contrast to their analytical separation in Western theory and practice, traditional West African music features integral connections among all the expressive arts (music, poetry, dance, and drama), the unity of rhythm and melody (what Nzewi calls "melo-rhythm"), and its centrality throughout expressive forms of song and dance, as well as music per se. Focusing on the Ewe people of south-eastern Ghana, I introduce the war dance Agbekor, highlighting its poly-melo-rhythms, and representing them in three notational systems: the well-known but culturally biased Western notation; a more neutral tabular notation that has been widely used in ethnomusicology but lacks structural expressivity; and a context-free recursive grammar of my own devising, providing maximal expressive power and generality for polyrhythms of all types. Examples are presented, and the strengths and drawbacks of each system are assessed.

SPATIAL NAVIGATION BY SEATED USERS OF MULTIMODAL AUGMENTED REALITY SYSTEMS

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Keywords:
Multimodal augmented reality
Motion platforms
Attitude and Heading
Reference System (AHRS)
Navigation performance
Virtual auditory display
Beacon sound

When seated users of multimodal augmented reality (AR) systems attempt to navigate unfamiliar environments, they can become disoriented during their initial travel through a remote environment that is displayed for them via multimodal AR display technology. Even when the multimodal displays provide mutually consistent visual, auditory, and vestibular cues to the movement of seated users through a remote environment, those users may make errors in judging their own orientation and position relative to their starting point, and also may have difficulty determining what moves to make in order to return to their starting point. In a series of experiments using multimodal AR systems featuring real-time servo-controlled movement of seated users, the relative contribution of virtual auditory display (VAD) technology was investigated in a range of spatial navigation scenarios. The results of those investigations have implications for the effective use of the auditory component of a multimodal AR system in applications supporting three-dimensional (3D) navigation through remote environments.

HUMAN COMMUNICATION AND BRAIN IMAGING: SOME STUDY EXAMPLES IN HUMAN-FACTORS ENGINEERING

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Keywords:
Neuroscience
Human-human
communication

Neuroscience research results have been recognized as a key to studying not only human cognition and human-human communication, but also to realize better machine-human communication. Neuroscience techniques have now become more accessible to researchers in many fields related to human behavior. These fields include human communication studies as well as knowledge-based and human-factors engineering. Neuroimaging, one of the techniques often used in neuroscience, can be effectively utilized to investigate activity and function in the brain. Functional neuroimaging studies focus on which areas of the brain perform specific tasks by using such techniques as functional magnetic resonance imaging, electroencephalography, and near-infrared spectroscopy (NIRS). Many studies in human-factors engineering try to bridge neuroscience data and an engineering system. However, it is not easy to incorporate neuroscience into engineering systems due to the difficulties of designing a human-factors study, measuring neuroactivities, and of interpreting the data. In this talk, the speaker will introduce some NIRS studies conducted by her research groups. The results of the studies will be presented in association with human-system interaction and human-human communication.

BIOMECHANICS IN REHABILITATION ENGINEERING

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Keywords:
Biomechanics
Orthopedics
Kinematics
electromyography

Biomechanics has traditionally been described as an interdisciplinary field that describes, analyzes, and evaluates human movement. Professionals such are orthopedic surgeons, sports trainers, rehabilitation engineers, kinesiologists, prosthetists, sports equipment designers, among others, are well interested in the Biomechanics field since it provides a global understanding of how human motion is produced. In order to obtain this understanding of human movement, three main characteristics are analyzed in Biomechanics: kinematics, kinetics, and electromyography. Kinematics describes the movement by itself without considering how the movement is been produced; kinetics explains the movement by the external forces acting on the body; electromyography is a technique that captures the electrical activity produced in the muscles when they are activated (i.e. describes the movement by the forces generated internally in the body). The knowledge obtained from a biomechanical study focusing on a clinical population (i.e. Clinical Biomechanics) combining the three characteristics previously described is essential for the understanding of the evolution of disorders that involve motor symptoms so that new ways of diagnosis and new approaches of treatments are developed, as well for the design and development of technology that improves healthcare safety and quality of life (i.e. Rehabilitation Engineering).

Semantic Relations and Rules in Compound Information Systems

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ABSTRACT

The industry standard for information systems in the field of technical communication are standalone systems. They work independently and are not necessarily compatible with each other. A solution to this problem are exchange formats like RDF, which enable a standardized information exchange between supported systems. An alternative solution would be Compound Information Systems.

In the following, we describe what Compound Information Systems are and how to implement semantic relations and rules into them.

## OBJECTIVES

Compound Information Systems

A Compound Information System (CIS) is a kind of system that combines several types of information systems. Primarily, three types of information systems are part of CIS: Component Content Management Systems (CCMS), Content Delivery Portals (CDP) and Semantic Modelling Systems (SMS).

CCMS are used to create and manage content and to assign metadata. CDP then present this content in a configurable online portal and deliver the content needed to the user according to the metadata. Lastly, SMS are utilized to create product ontologies. An ontology defines all relevant objects and their possible interactions with each other within a certain field. This data can be used to optimize content delivery in the CDP.

Usually, these systems are standalone and are not combined into one. They may be provided by different vendors, which can hinder the compatibility between them and therefore impede the data exchange.

Ontolis as an example for CIS

Ontolis by ONTOLIS GmbH is a proprietary web-based compound software. The main component of this software is the SMS used to create ontologies according to the customers' request. These ontologies represent the base in product modelling and serve as structured central knowledge basis. A unique feature of Ontolis' SMS is the structure of its ontology. The industry standard for ontologies are net structures whereas Ontolis uses a tree structure.
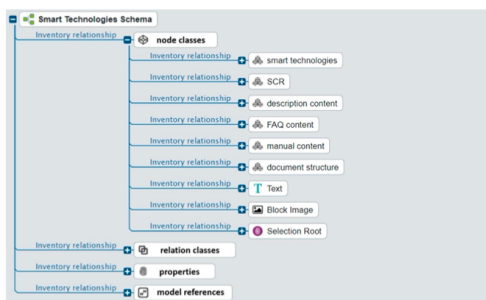
The screenshot above shows an ontology in the field of smart home in Ontolis. For a proper ontology classes, subclasses, instances, relations and properties are needed.

Beside the SMS component, Ontolis can be used as a CCMS and CDP, as well as for terminology and localization management. Although Ontolis is an CIS, not all components have to be used simultaneously, depending on the projects scope.

Integration of standard models

Semantic Correlation Rules (SCR) are rulesets that define correlations between information objects in a standardized way using existing object metadata. They are independent of specific content and can be modelled and used in different system environments through RDF import and export.

SCR are basically a lightweight ontology. Therefore, the modelling is simple in comparison to the sophisticated ontology modelling. When modelling SCR, all that is needed is the information on metadata and basic knowledge in the field of semantic modelling.

Application of SCR in Ontolis

SCR can be implemented and used in Ontolis, primarily in the CDP component.
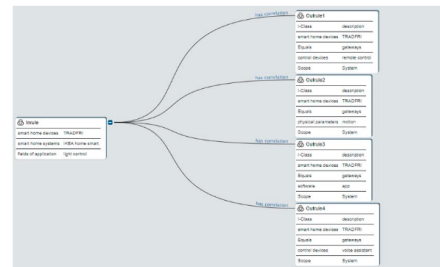
The screenshot above shows the modelling of a SCR ruleset based on a specific use case. The inrule has correlations to all 4 outrules and the in- and outrules are tagged with metadata.

The screenshot on the right shows the effect of SCR in the CDP. This list is generated dynamically based on the correlating in- and outrules of the selected topic. Users of the CDP can find topics that might interest them much faster and more conveniently than without the use of SCR.
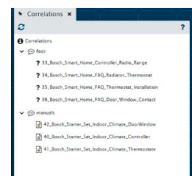
DISCUSSION AND CONCLUSION

To conclude, if there is no system already in use, a Compound Information System, which combines CCMS, SMS and CDP, might be an appropriate choice. If there is already a CCMS and CDP in use that supports exchange formats, a CIS might not be necessary. This will allow for an easy exchange of information between the information systems. SCR can be implemented in both scenarios to deliver the appropriate amount of content in a more precise manner to the end user.

REFERENCES

[1] Ziegler, W. (2019). „Drivers of Digital Information Services: Intelligent Information Architectures in Technical Communication". *2019 ACM Chapter Proceedings on Educational Technology, Language and Technical Communication,* ISSN: 2434 – 9526, (2019) VOLUME 1, S. 48-52.

[2] Ziegler, W. (2019). Delivery zwischen Kontext und Content. *technische kommunikation*, 58–61.

[3] Ziegler, W. (2020). Extending intelligent content delivery in technical communication by semantics: microdocuments and content services. *Proceedings of the ETLTC ACM Chapter International Conference. Aizuwakamatsu, Japan. (2020)*

ACKNOWLEDGEMENTS AND CONTACTS

Creating content and use cases for testing Semantic Correlation Rules in Content Delivery

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INTRODUCTION AND OBJECTIVES

In general, information retrieval (IR) systems like Content Delivery Portals (CDP), help users to complete search tasks. One main problem of IR is, that selected content modules are often presented without context [1]. One approach to meet this problem is the use of microDocs and Semantic Correlation Rules (SCR). When using this approach, an existing semantic classification of the content is a necessary precondition [2]. SCR can be implemented in Component Content Management Systems (CCMS), ontology systems and CDP only [3]. Some vendors already started to implement SCR. The different levels of integration offer the possibility to analyze the impact that SCR has on the functionality of the CDP.

A system-based evaluation is a standard approach for system testing. To test the impact of SCR on CCMS-based CDP, a test collection and a corresponding metadata architecture is built [4]. For evaluation purposes, precision and recall is a common and appropriate methodology. [5]

CONCEPT AND IMPLEMENTATION

Test Collection

To create an experimental environment, we created a test collection which consists of three components. The corpus represents the largest part. The collection of documents is the result of internet research in the field of smart homes. To define the user's needs, we have developed four use cases based on the document corpus. Per use case, we identified an actor who represents the user and his situation. For each retrieval task, we have defined one InRule and a set of OutRules. The related judgement defines, which documents are relevant for every single information needed. Per use case, we identified the documents relevant for the document corpus. Evaluating every document in the corpus for the respective use case is the only way to guarantee, that all relevant documents are known [6].

Implementation in CCMS

To show an exemplary implementation of SCR, we decided to use a CCMS with attached CDP. We decided to work with the Smart Media Creator by Expert Communication Systems. This is a web-based XML-editing-system for content management with connected CDP.

We created the content of our document corpus as modules in the CCMS. The standard procedure in a CCMS is to classify content with a metadata architecture. Simultaneously, we built an ontology to implement the SCR by defining the InRules and correlating OutRules [1].

The defined SCR do not have any functional impact on the CCMS itself. The impact is only shown in the CDP. Therefore, we had only considered the CDP for testing.

Testing in Delivery Portals

The focus while testing was on the effectiveness and accuracy of CDP according to the implemented SCR. As a result, precision and recall is the appropriate methodology. In our testing scenario, each defined use case represents one user query. For each user query, we used the same procedure. For each use case, we defined the total number of relevant documents. With the number of relevant documents and the total number of documents found, we were able to calculate recall and precision.

The diagram below shows an average recall precision graph of a CDP without SCR. The ideal result for precision as well as for recall is 1. This indicates that the system retrieved all relevant documents and there were no irrelevant documents within the result set [5].

Our testing results have shown, that this is the case for the tested CCMS-based CDP. Consequently, SCR allow to improve the values of recall and presion significantly.
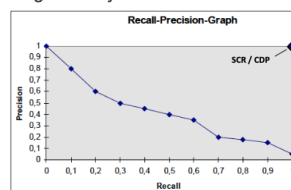
RESULTS AND OUTLOOK

The testing result has shown that the implementation of SCR in the CCMS used has been successfully realized already. It can be said/stated/concluded, that SCR can solve the problem of lack of context in information retrieval. SCR enable the delivery of further content according to the retrieval task to fulfill the users' information needs. Considering administration, SCR replace manual linking content modules.

Therefore, they reduce the administrative effort. In future, an export and import feature for SCR would decrease the effort even more. The use of CCMS for the definition of SCR is unusual/uncommon. The reason for this is, that most CCMS classify the content based on metadata but SCR are created based on ontologies. This results in the problem, that redundant creation and maintenance efforts are required. This leads to a potentially increased error rate. Future work should allow to work with one classification only.

REFERENCES

[1] Ziegler, W. (2020). *Regelmäßig Inhalte vernetzen.* Tagungsbeitrag tcworld online conference.

[2] Ziegler, W. (2020). *Regelmäßig Verbindungen schaffen.* Technische Kommunikation, H.6, S. 18-25.

[3] Ziegler, W. (2020). *Extending intelligent content delivery in technical communication by semantics: microdocuments and content services.* Proceedings of the ETLTC ACM Chapter International Conference. Aizuwakamatsu, Japan.

[4] Ziegler, W. (2020). *Wie Semantik Inhalte intelligent verbindet – microDocs und mehr.* DOKU+MEDIEN-FORUM 2020, Hamburg.

[5] Quasthoff, U. (2009). *Information Retrieval.* Universität Leipzig Institut für Informatik, S. 2-15

[6] Carterette, B. / Voorhees, M. (2010). *Overview Information Retrieval Evaluation.*

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About the ACM Chapter on eLearning and Technical Communication

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 are 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 A major focus of this chapter is also to organize international conferences in educational technology, information design, language studies, and technical communication, thereby building a community of academic and industry professionals who are interested in cross-disciplinary and cross-cultural initiatives related to the above-mentioned fields of study

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