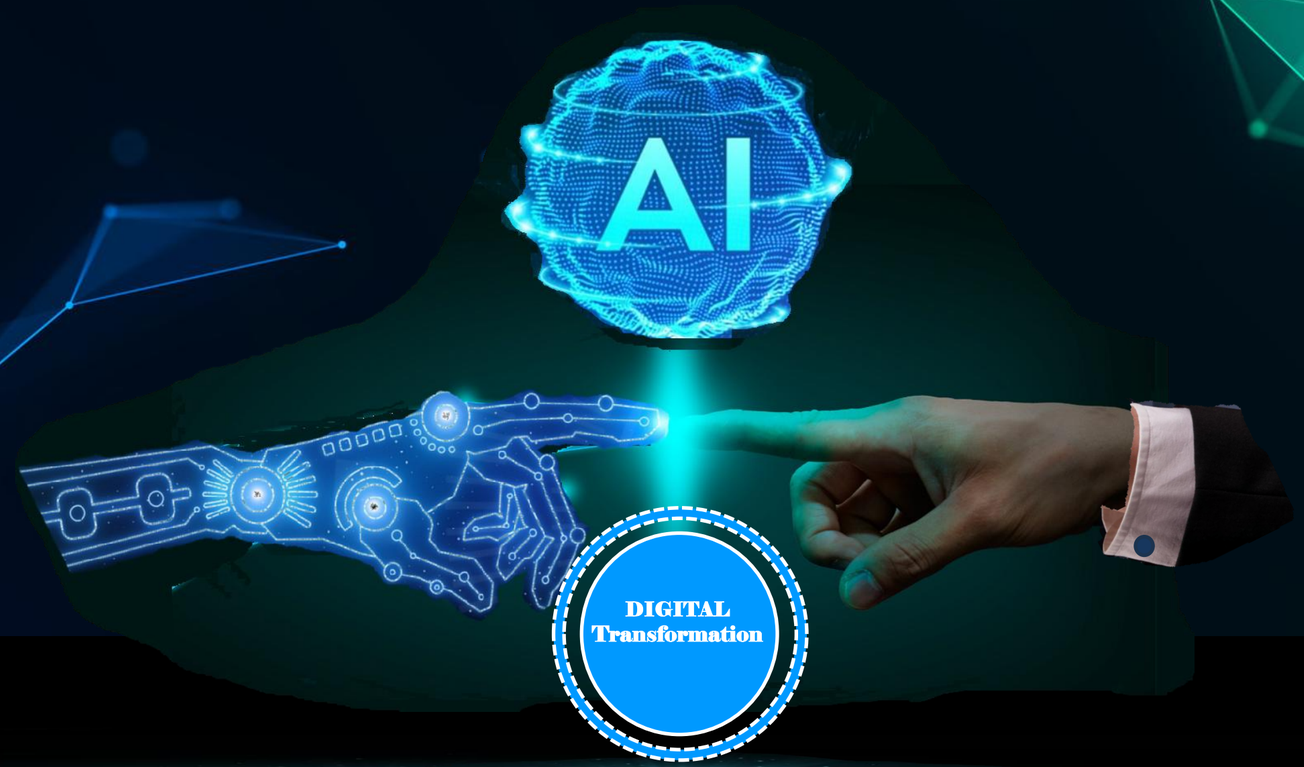
PROJECT CONSULTING

PROJECTCONSULTING
PMI Innovativa

Innovative Solutions for a Secure Digital Transformation

LEADING THE FUTURE WITH AI



EALTH

AGENDA

- About Us
- Our Vision
- Our Mission

Our Value Proposition

- R&D PROJECTS “LIFE SCIENCES”
- Scientific Collaborations
- Why choose PJC
- Our TEAM

ABOUT US

Project Consulting has *26 years* of experience in *IT Innovation and Digital Transformation* powered by *AI technologies.*

We deliver *innovative solutions*, ensuring quality, accuracy and precision, always supported by careful governance of data Security.

The experience and commitment of Our Team drive *customer success* and *business growth*

OUR VISION

To be a

Pillar of Innovation in Security and AI

and build lasting value through

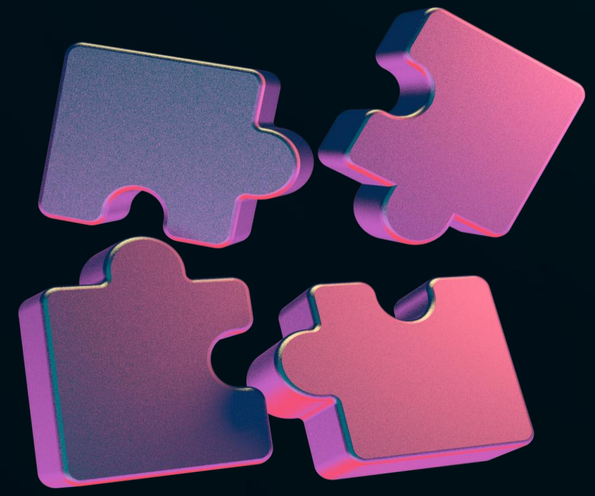
cutting-edge solutions,
professional excellence,
continuous improvement,
reliability

OUR MISSION

Our mission is to leverage:

- our *long-standing experience*,
- the *many skills* acquired in 26 years of history,
- our *ability to innovate* using the power of AI,
- our *deep knowledge of IT and Cyber Security technologies*,
- our *good knowledge of regulatory standards and frameworks*

To provide our Customers with
cutting-edge digital transformation strategies and the most performing AI solutions.



R&D PROJECTS “LIFE SCIENCES”

SHAPE

Definition of a *theoretical model* capable of explaining the interaction between the *gravitational* field and *living organisms*.

CCI – Cancer Cell Investigation

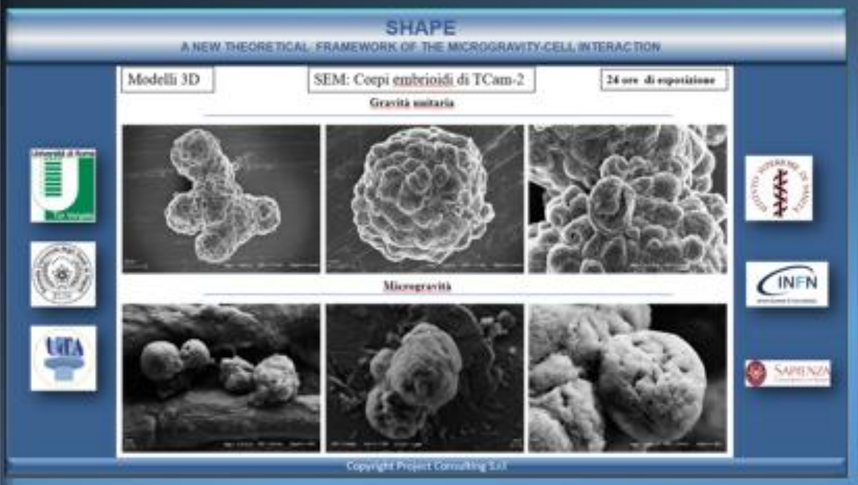
Solution for Cervical Cancer Cell Recognition through Automated Pap Smear Slide Analysis

BIANCA

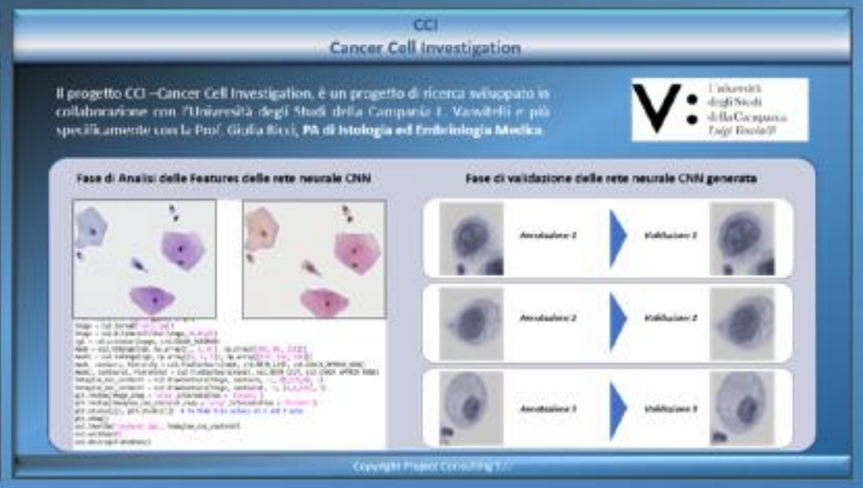
Application of *Machine Learning* algorithms to *mammographic image* analysis for breast *tumor detection* and classification.

R&D PROJECTS “LIFE SCIENCES”

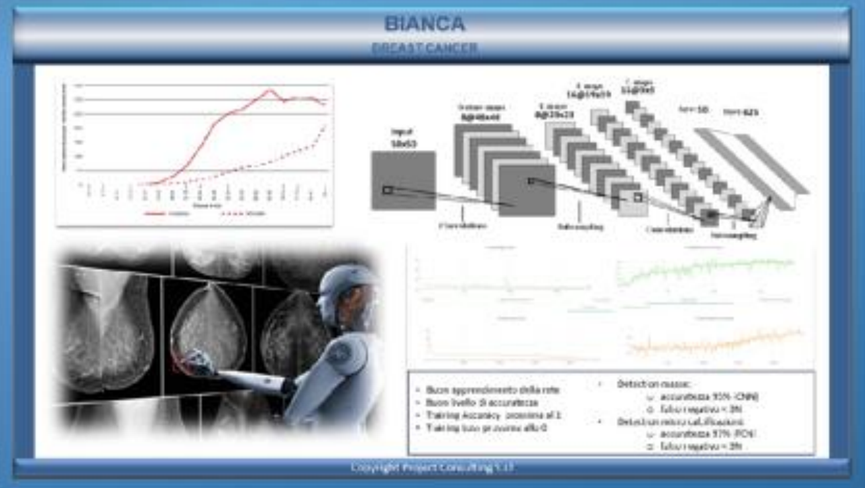
AIVA - Life Science



SHAPE



CCI Cancer Cell Investigation



BIANCA

The Shape project, which began on October 9, 2014, and ended on November 23, 2018, is a research project funded by the ASI (Italian Space Agency) with the aim of answering questions relevant to human space exploration, but at the same time capable of producing important implications on the ground for the study of Biology and Medicine.

Shape Project Objective: Definition of a theoretical model capable of explaining the interaction between the gravitational field and living organisms.

Innovative method: To refine the experimental model and scientific methodology inherent in the study of microgravity and investigate to what extent the effect induced by microgravity on living structures is dose-dependent and within what time limits it can be defined as reversible.

SHAPE

A NEW THEORETICAL FRAMEWORK OF THE MICROGRAVITY-CELL INTERACTION

3D Models

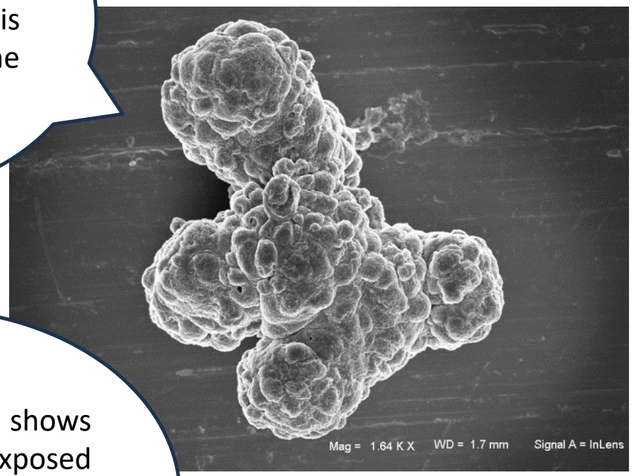
SEM: TCam-2 embryoid bodies

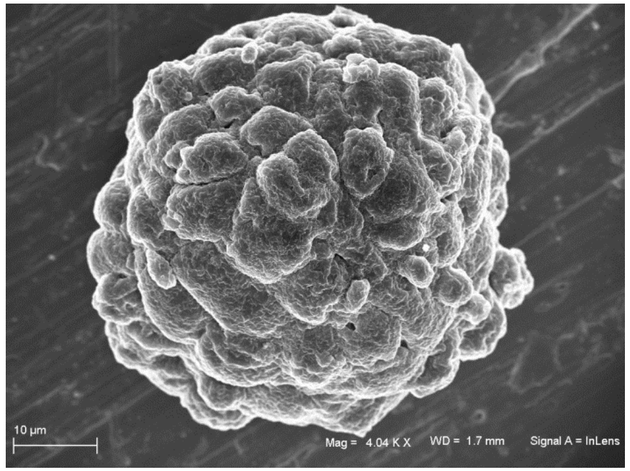
24 hours of exposure

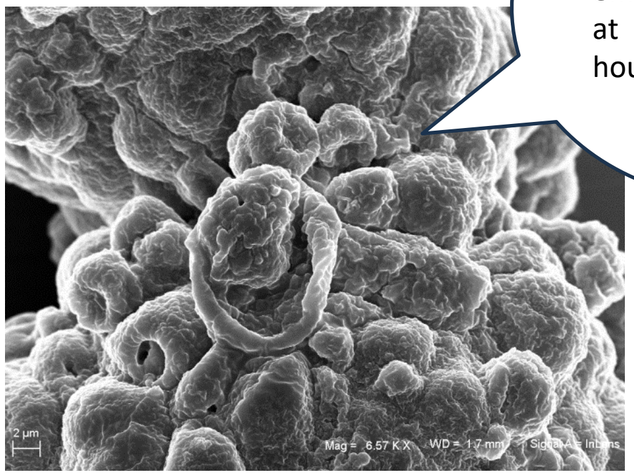
The images are representative of the type of analysis carried out in the project

The top panel shows embryoid bodies held at unit gravity for 24 hours;

Unit gravity

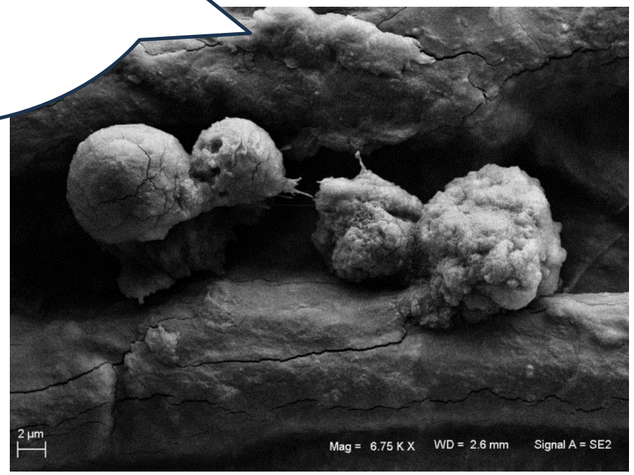






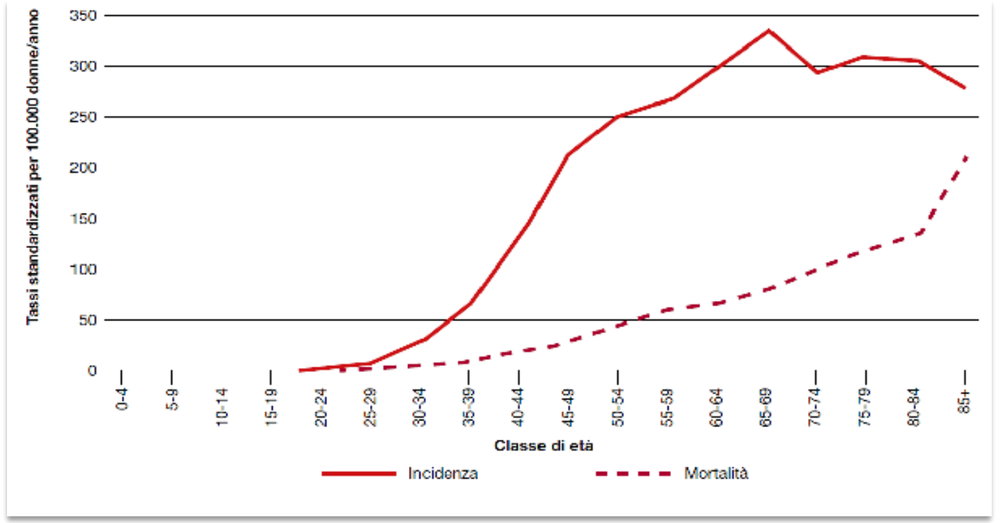
The lower panel shows embryoid bodies exposed to simulated microgravity for the same amount of time.

Microgravità



SEM images show how the surface of the "embryoid bodies" maintained in simulated microgravity is smoother and the cellular boundaries less identifiable. The project analyzed in detail the changes produced by microgravity and the limits and conditions within which the previous characteristics could be restored.

Breast cancer is the most common cancer in women worldwide, the second leading cause of cancer deaths in women.It is a highly curable disease when diagnosed early, but at the same time, a dangerous disease when discovered too late..



The incidence of this disease is constantly increasing, but the 5-year survival rate after diagnosis is approaching 90%, while breast cancer mortality has decreased by almost 35% in the last 20 years.

The research led to the creation of a CNN, a particular type of artificial neural network used primarily for image analysis and the application of graphical filters, belonging to the deep learning field.The mammography datasets used in this work were:

Mammographic Image Analysis Society, is an open-source database maintained by University College London.

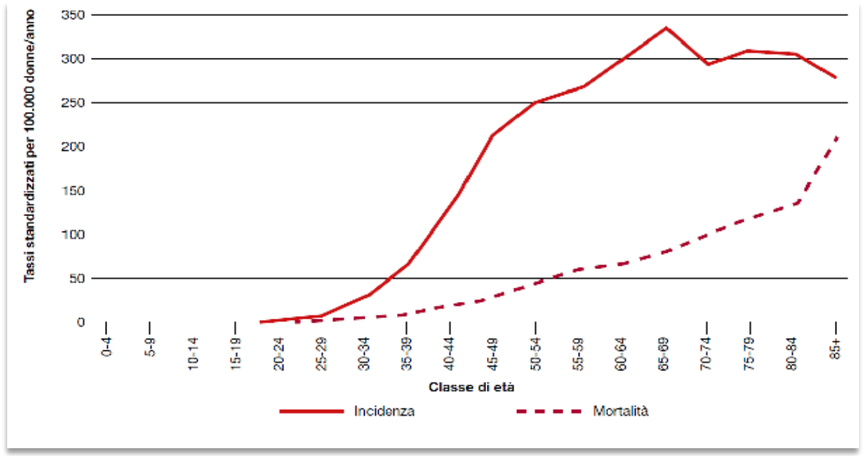
MIAS

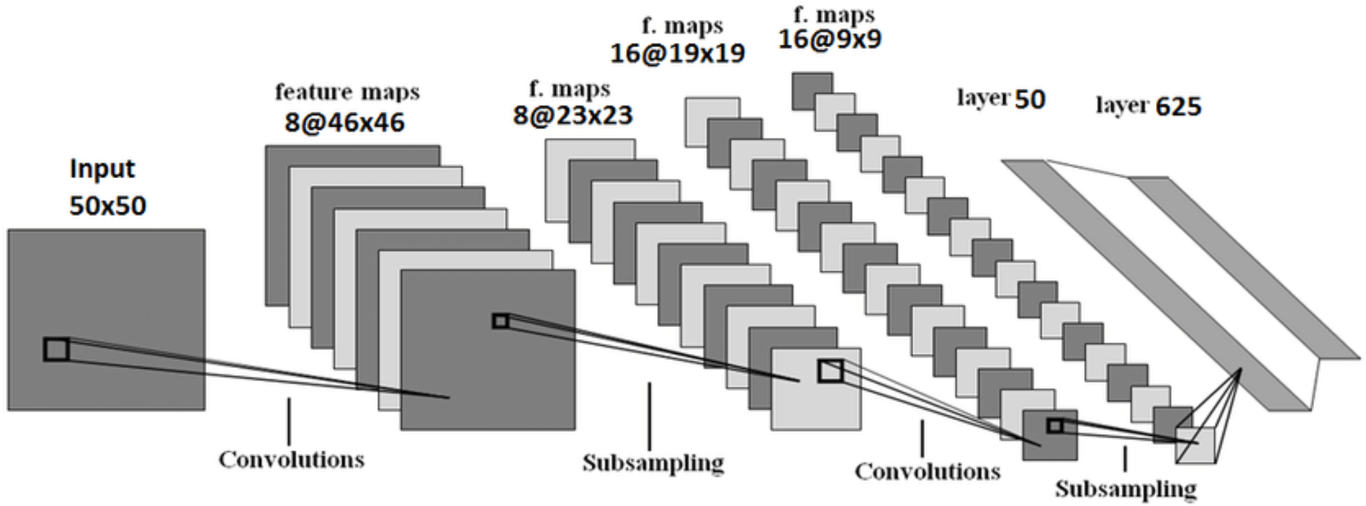
DDSM

- Il **Digital Database for Screening Mammography** (DDSM), Database created by Massachusetts General Hospital, Sandia National Laboratories, and the Department of Science and Engineering at the University of South Florida.

BIANCA

BREAST CANCER





- Buon apprendimento della rete
- Buon livello di accuratezza
- Training Accuracy prossima al 1
- Training Loss prossima allo 0

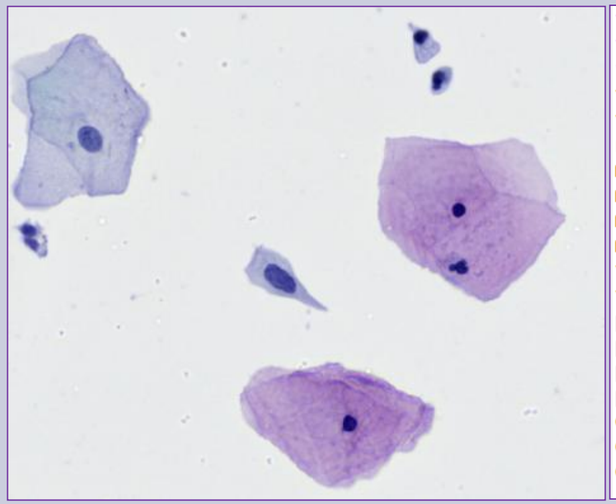
- Detection masse:
  - accuratezza 95% (CNN)
  - falso negativo < 3%
- Detection micro calcificazioni:
  - accuratezza 97% (FCN)
  - falso negativo < 3%

CCI
Cancer Cell Investigation

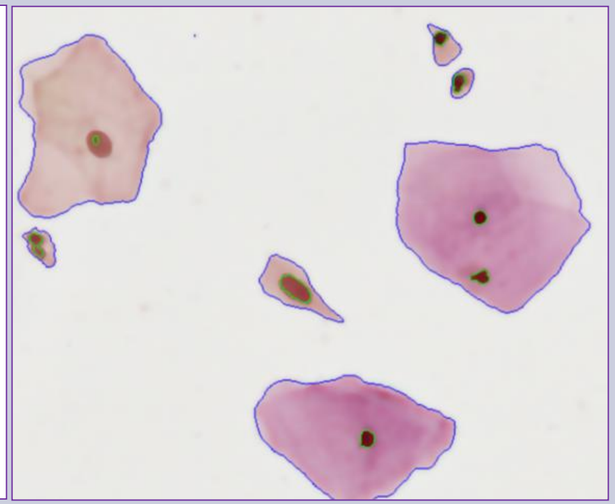
The CCI – Cancer Cell Investigation project is a research project developed in collaboration with **Professor Giulia Ricci, Professor of Histology and Medical Embryology** at the University of Campania L. Vanvitelli. The project applies Convolutional AI Networks to the study of cervical cells for the early identification of precursor parameters of oncogenic alterations.

Università degli Studi della Campania *Luigi Vanvitelli*

Feature analysis phase



```
import numpy as np
import cv2
from matplotlib import pyplot as plt
image = cv2.imread('cell.jpg')
image = cv2.bilateralFilter(image,10,95,95)
rgb = cv2.cvtColor(image, cv2.COLOR_BGR2RGB)
mask = cv2.inRange(rgb, np.array([1, 1, 6]), np.array([140, 88, 214]))
mask2 = cv2.inRange(rgb, np.array([5, 5, 5]), np.array([212, 212, 236]))
mask, contours, hierarchy = cv2.findContours(mask, cv2.RETR_LIST, cv2.CHAIN_APPROX_NONE)
mask2, contours2, hierarchy2 = cv2.findContours(mask2, cv2.RETR_LIST, cv2.CHAIN_APPROX_NONE)
immagine_con_contorni = cv2.drawContours(image, contours, -1, (0,255,0), 1)
immagine_con_contorni = cv2.drawContours(image, contours2, -1, (0,0,255), 1)
plt.imshow(image,cmap = 'gray',interpolation = 'bicubic')
plt.imshow(immagine_con_contorni,cmap = 'gray',interpolation = 'bicubic')
plt.xticks([]), plt.yticks([])  # to hide tick values on X and Y axis
plt.show()
cv2.imwrite('contorni.jpg', immagine_con_contorni)
cv2.waitKey(0)
cv2.destroyAllWindows()
```



Università degli Studi della Campania *Luigi Vanvitelli*

Dataset analysis workflow

		Output	
1	Splitting the initial slide into a set of sub-images	Total slide image	Set of sub-images (slices)
2	Search and construction of possible ROIs of nuclei with saturation reduction on the ROIs	Directory containing the slices	Set of directories containing each slice in which nuclei are highlighted
3	Optimization with a convolutional network to identify the ROIs that actually contain the nuclei	Directory containing the images with ROI	Directory containing imageswith ROI
4	Classification of the identified ROIs using a convolutional network	Directory containing images with ROI output at point 3	Directory with positive and negative detection
5	Complete image reconstruction from the analyzed slices and wrapping on the identified ROIs	Directory containing the ROI	Complete image

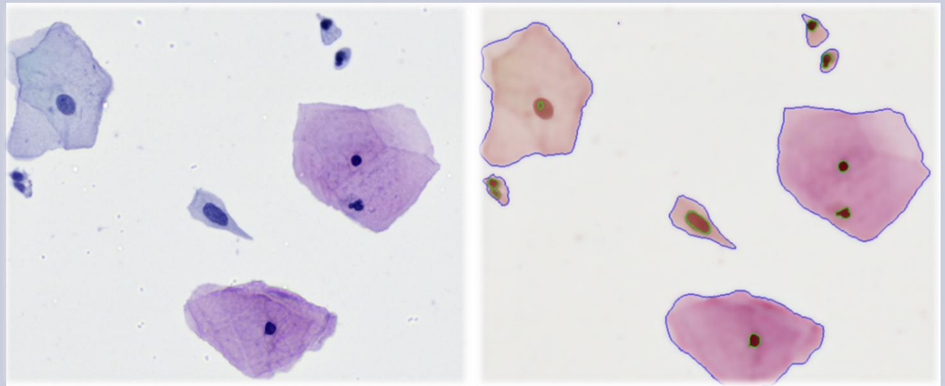
Università degli Studi della Campania *Luigi Vanvitelli*

Validation phase of CNN

CCI
Cancer Cell Investigation

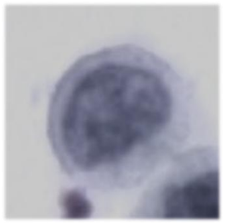
Università degli Studi della Campania *Luigi Vanvitelli*

Features analysis



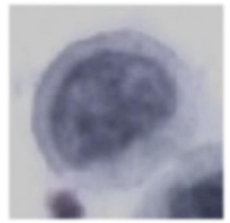
```
import numpy as np
import cv2
from matplotlib import pyplot as plt
image = cv2.imread('cell.jpg')
image = cv2.bilateralFilter(image,10,95,95)
rgb = cv2.cvtColor(image, cv2.COLOR_BGR2RGB)
mask = cv2.inRange(rgb, np.array([1, 1, 6]), np.array([140, 88, 214]))
mask2 = cv2.inRange(rgb, np.array([5, 5, 5]), np.array([212, 212, 236]))
mask, contours, hierarchy = cv2.findContours(mask, cv2.RETR_LIST, cv2.CHAIN_APPROX_NONE)
mask2, contours2, hierarchy2 = cv2.findContours(mask2, cv2.RETR_LIST, cv2.CHAIN_APPROX_NONE)
immagine_con_contorni = cv2.drawContours(image, contours, -1, (0,255,0), 1)
immagine_con_contorni = cv2.drawContours(image, contours2, -1, (0,0,255), 1)
plt.imshow(image,cmap = 'gray',interpolation = 'bicubic')
plt.imshow(immagine_con_contorni,cmap = 'gray',interpolation = 'bicubic')
plt.xticks([]), plt.yticks([])  # to hide tick values on X and Y axis
plt.show()
cv2.imwrite('contorni.jpg', immagine_con_contorni)
cv2.waitKey(0)
cv2.destroyAllWindows()
```

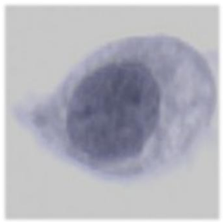
Validation phase of CNN



Annotazione 1

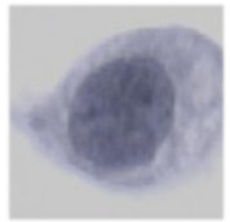
Validazione 1

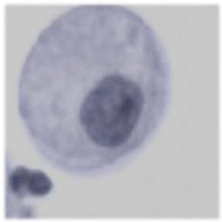




Annotazione 2

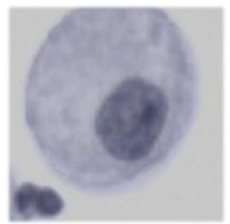
Validazione 2



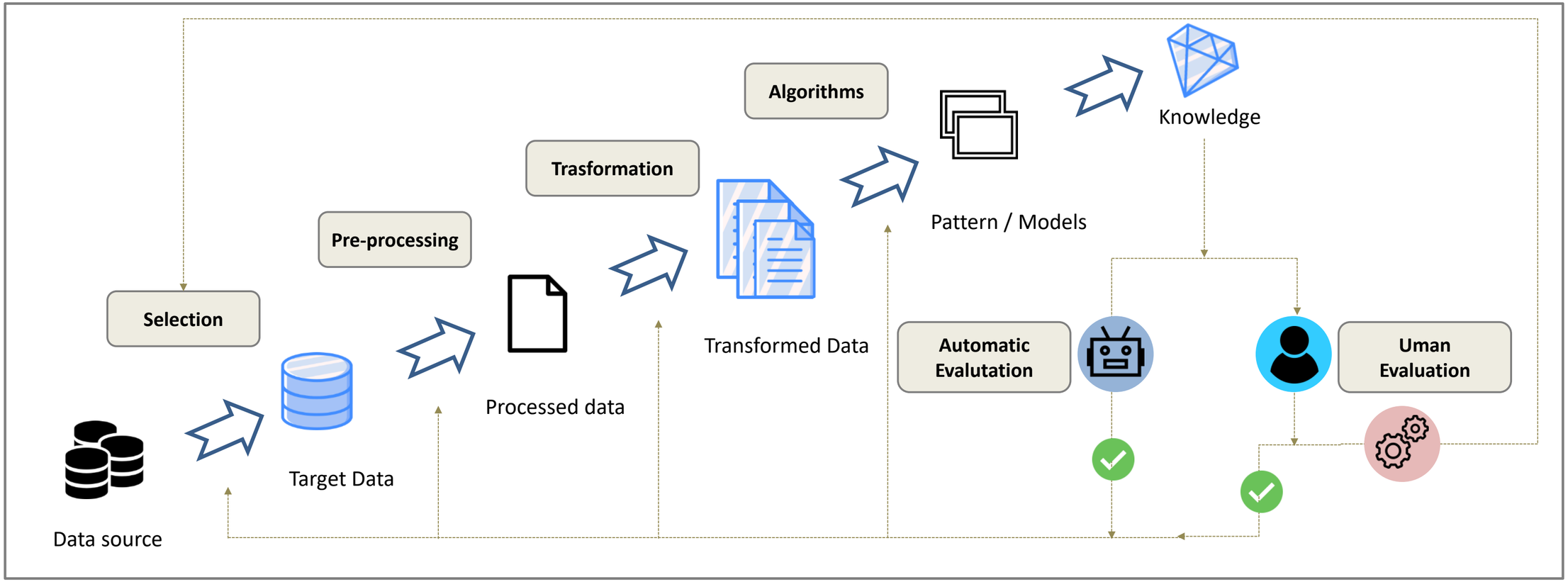


Annotazione 3

Validazione 3



Management of extracted knowledge



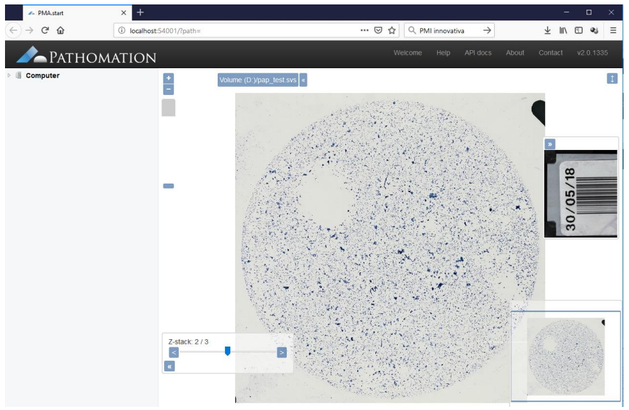
Automatic evaluation	Valutazione umana
Faster network learning	Slower speed in the network learning process
Lower margin for error	Greater margin for error
Automatic inclusion of extracted knowledge	Human interpretation before incorporating extracted knowledge

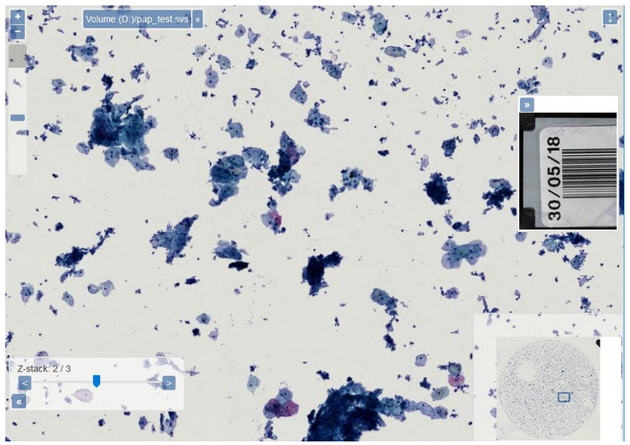
Approach to follow in the medical field

Input Data Example

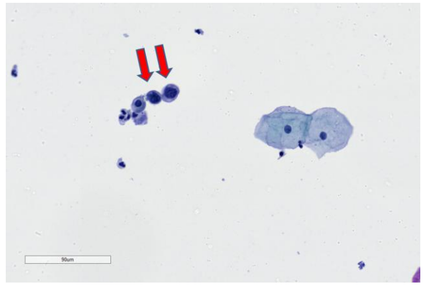
Università degli Studi della Campania *Luigi Vanvitelli*

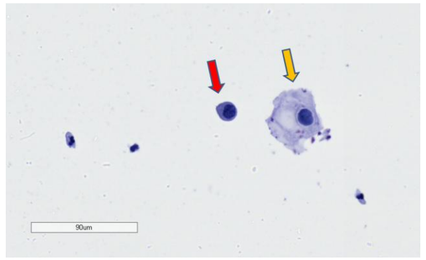
Slide

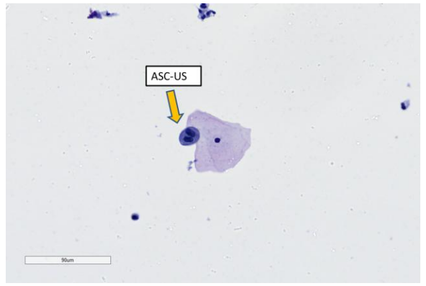




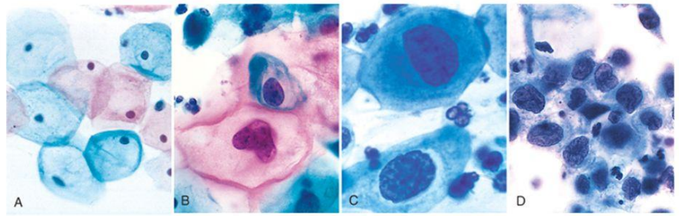
Annotations







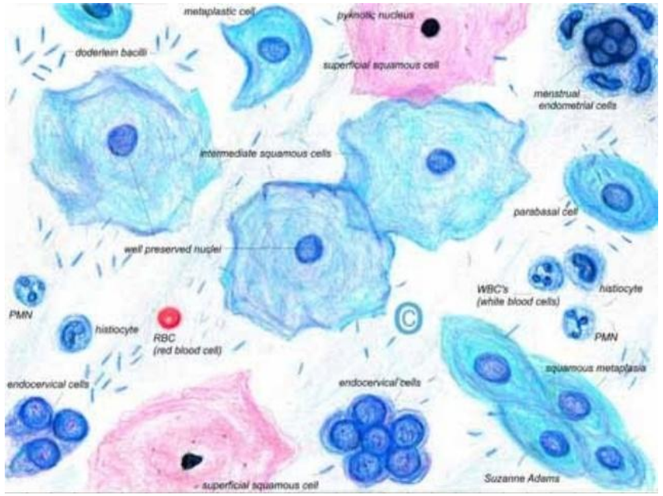
Descriptions



normal | CIN I | CIN II | CIN III

"Low-grade dysplasia" | "High-grade dysplasia"

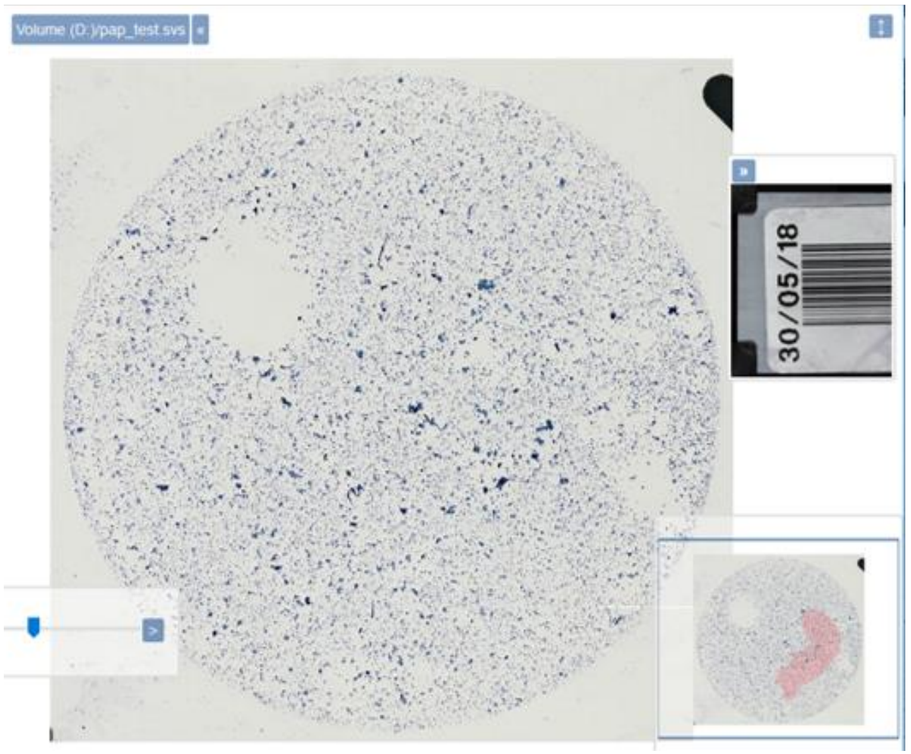
Cytology of CIN (Pap smear)



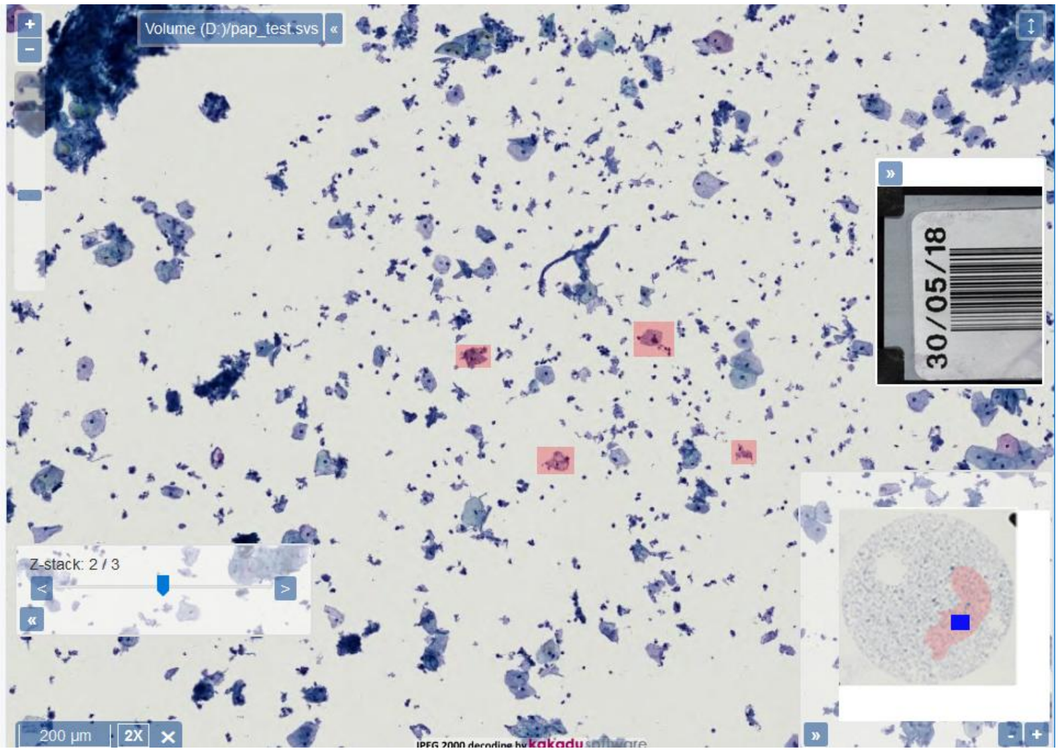
Università degli Studi della Campania *Luigi Vanvitelli*

Output Data Example

Cancer Zone Identification

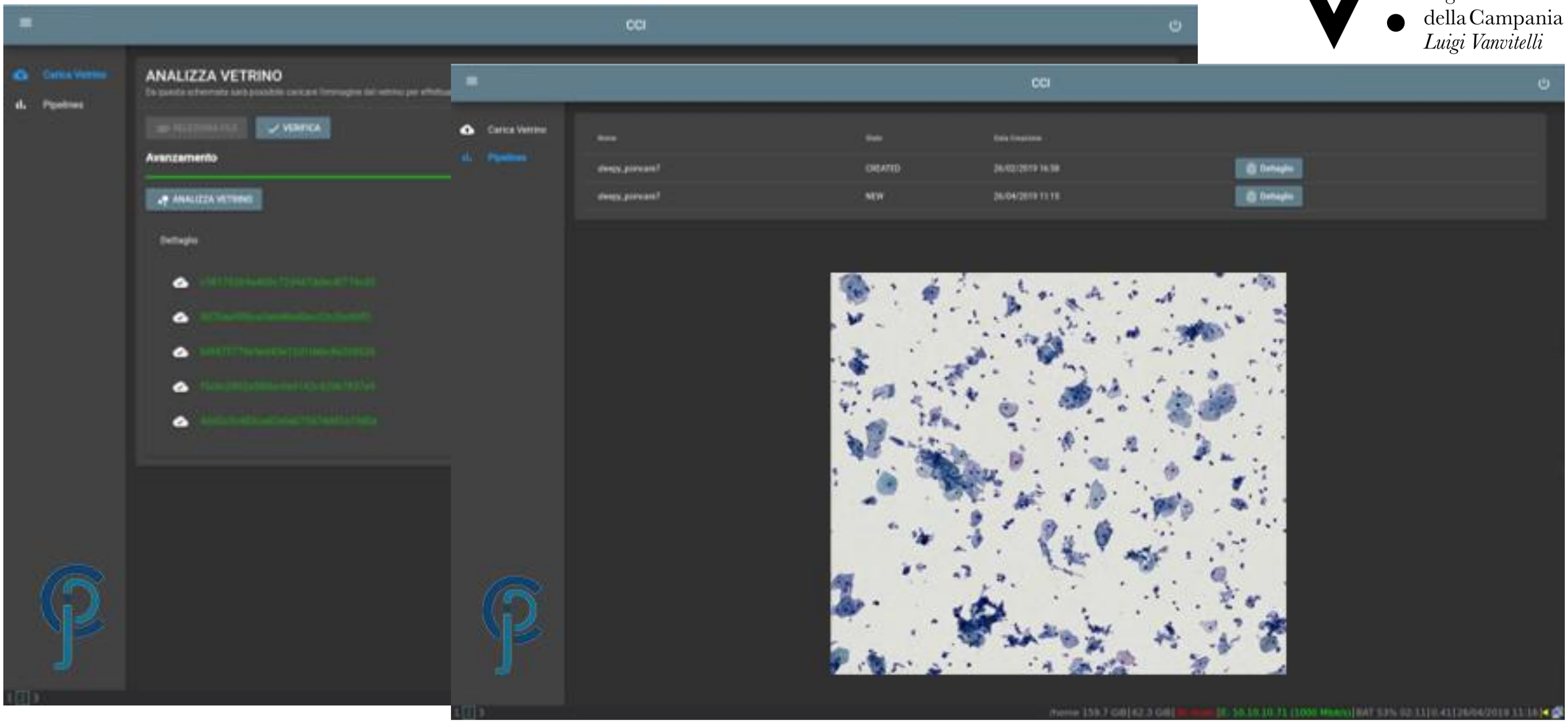


Cancer Cell Detection



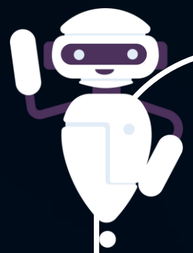
User Interface

Università degli Studi della Campania *Luigi Vanvitelli*

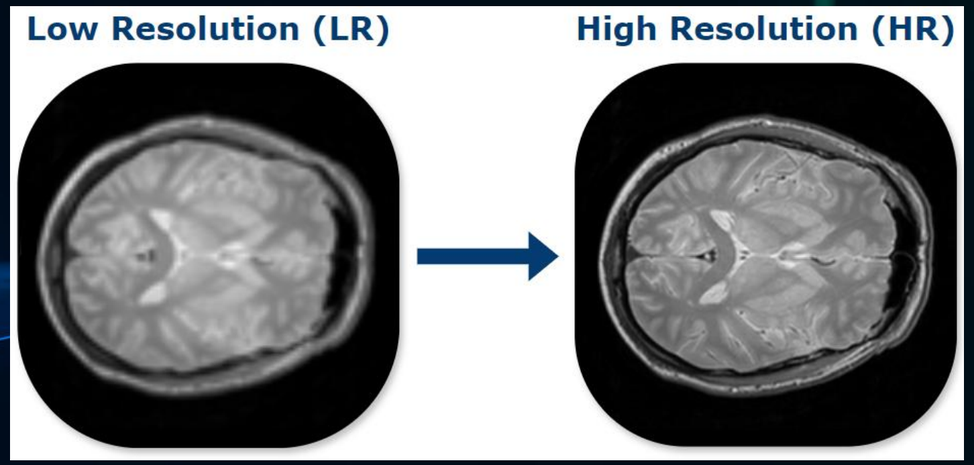


Discrete Wavelet Transform Super Resolution Network (DWTSRNet)

The aim of this project is to support medical generating a **high-resolution** image from a single **low-resolution** one.



Single Image Super Resolution (SISR)



Single Image Super Resolution is a computer vision task that aims to generate a high-resolution image from a single low-resolution one.

SCIENTIFIC COLLABORATIONS

UNIVERSITÀ

Università degli Studi della Campania *Luigi Vanvitelli*

UNIVERSITÀ DEGLI STUDI DI UDINE
hic sunt futura

Ud'A Università degli Studi "G. d'Annunzio"

UNIVERSITÀ DEGLI STUDI DI NAPOLI FEDERICO II

ROMA TRE UNIVERSITÀ DEGLI STUDI

SAPIENZA UNIVERSITÀ DI ROMA

Un. Roma Tre – Dip. di Matematica e Fisica

Prof. Luciano Teresi – PA di Fisica e Matematica

Formazione

- Laurea con lode in Ingegneria Aeronautica, Sapienza, Università di Roma, 1991
- Ph.D. Theoretical and Applied Mechanics, Sapienza, Università di Roma, 1996

Attività di Ricerca

Computer Vision and Shape analysis: motion mapping; 3D vision; quantification of shape differences indeforming bodies; transport of deformation.

Attività Didattica e Istituzionale

Membro dello Scientific Committee del Master in Data Analytics, dal 2021.
Insegnamento, presso il CdS magistrale in Scienze Computazionali, Università Roma Tre:
- Metodi matematici per il Machine Learning (dal 2023);
- Algebra Lineare per Machine Learning (dal 2020 al 2022);
Presso il Master Data Analytics:
- Neural Networks with MATLAB (dal 2021)

Univ. L. Vanvitelli – Dip. Di Medicina Sperimentale

Prof. Giulia Ricci- PA di Istologia ed Embriologia Medica

Formazione:

- Laurea Magistrale in Scienze Biologiche
- Dottorato in Scienze e Tecnologie Cellulari
- Specializzazione in Patologia Clinica

Competenze scientifiche:

- Embriologia e meccanismi del differenziamento
- Fisiopatologia dell'apparto riproduttivo
- Fisiopatologia delle cellule tumorali
- Microscopia Ottica, Ottica Confocale ed Elettronica
- Biomedicina Spaziale

Progetti di ricerca di interesse per il presente bando:

- **2014: SHAPE - A new theoretical framework of the microgravity-cell interaction**
- **2019: CCI – Cancer Cell Investigation**

Università degli Studi della Campania *Luigi Vanvitelli*

Partnership Un. Roma Tre e PJC
Dottorati di Ricerca

ROMA TRE UNIVERSITÀ DEGLI STUDI

PROJECTCONSULTING

PON RICERCA E INNOVAZIONE

RIPROGRAMMAZIONE REACT EU

MISSIONE 4 ISTRUZIONE RICERCA

MUR

Finanziato dall'Unione europea NextGenerationEU

Ministero dell'Università e della Ricerca

1st PhD:

Starting January 1, 2021 - 3rd-year PhD

Scholarship topic: Computer Vision and Motion Amplification for Vibration Analysis

PhD scholarship from the National Operational Programme for Research and Innovation 2014-2020 (CCI 2014IT16M2OP005), ESF REACT-EU resources,

Action IV.4 "PhD programs and research contracts on innovation topics" Action IV.5 "PhD programs on green topics"

2nd PhD

Starting January 1, 2024 – 3rd-year PhD

Scholarship topic: Machine Learning and 3D Computer Vision

Doctoral Scholarship from the Ministerial Decree 118 Program - Digital and Environmental Transformation (funded by the Lazio Region)

Research Contract

Immacolata Belviso

RTD/A Beginning date 30.12.2021

RTDA

Research Project: Innovative Therapeutic Approaches for the Treatment of Ischemic Cardiomyopathy

PON "Research and Innovation" 2014-2020 (PON R&I) –

ACTION IV.4 RESEARCH CONTRACTS ON INNOVATION TOPICS

The project aims to develop and apply innovative therapeutic approaches for the treatment of ischemic cardiomyopathy, leveraging the integration of regenerative medicine techniques and artificial intelligence algorithms.

WHY CHOOSE PJC?

EXPERTISE

Biomedical researchers, AI scientists, digital transformation and security architects are the strength of our multidisciplinary team, which works passionately to integrate these skills to find cutting-edge solutions

R&D Team

A strong, close-knit and passionate R&D team, with strong capabilities in AI, Edge Computing and Biomedical Area.

INNOVATION

We have chosen to be a company with a strong innovative footprint, for this reason we study and apply the most innovative technologies capable of supporting biomedical research to produce new exciting solutions for human health.

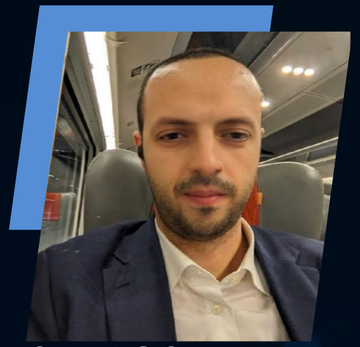
OUR "AUGMENTED" TEAM

Of RESEARCHERS and INNOVATORS

PROJECTCONSULTING
PMI Innovativa

MORENA LA MONACA

MASSIMO FUCCI



STEFANO CATANIA

CASIMIRO DEL TRONO

ELENA GAGGINI

PROJECTCONSULTING

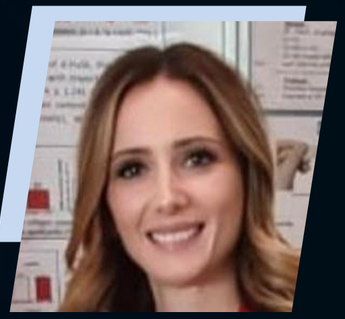
INDUSTRIAL RESEARCHERS

DORA MARIGGIO

Ud'A
Università degli Studi "G. d'Annunzio"

GIULIA RICCI

IMMACOLATA BELVISO



ANNA MARIA SACCO

CLOTILDE CASTALDO

FRANCA DI MEGLIO

Università degli Studi della Campania *Luigi Vanvitelli*

UNIVERSITÀ DEGLI STUDI DI NAPOLI FEDERICO II

BIOMEDICAL RESEARCHERS

LUCIANO TERESI

PIETRO CESTOLA

MUHAMMAD USMAN

ROMA TRE
UNIVERSITÀ DEGLI STUDI

MATHEMATICAL RESEARCHERS

PROJECT CONSULTING
PMI Innovativa

CONTACT US

06 94363621

info@pjc.it

www.pjc.it

Via Serravalle di Chienti, 15 - 00156 Roma

PROJECTCONSULTING
PMI Innovativa

THANK YOU!

FOR YOUR ATTENTION