

The benefite of AI in clinical diagnosis

Shaping the Future of Healthcare:
Revolutionizing Diagnostics with Digital
Pathology and Artificial Intelligence

27/06/2024

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Building a Better Tomorrow

We are the largest Italian **Tech Company** and the ultimate **business partner** for **sustainable digital transformation**

We seamlessly integrate **business, technology** and **ESG principles**, offering comprehensive **advisory, implementation** and **managed services** that accelerate innovation, drive global success and promote sustainability.

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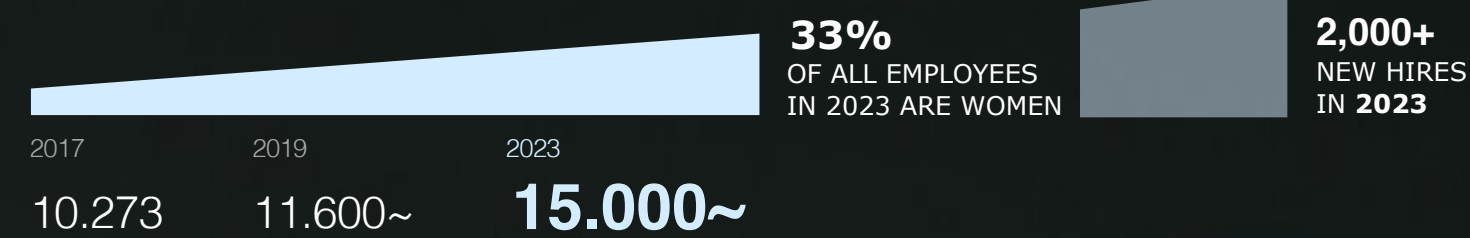
At a Glance

REVENUE

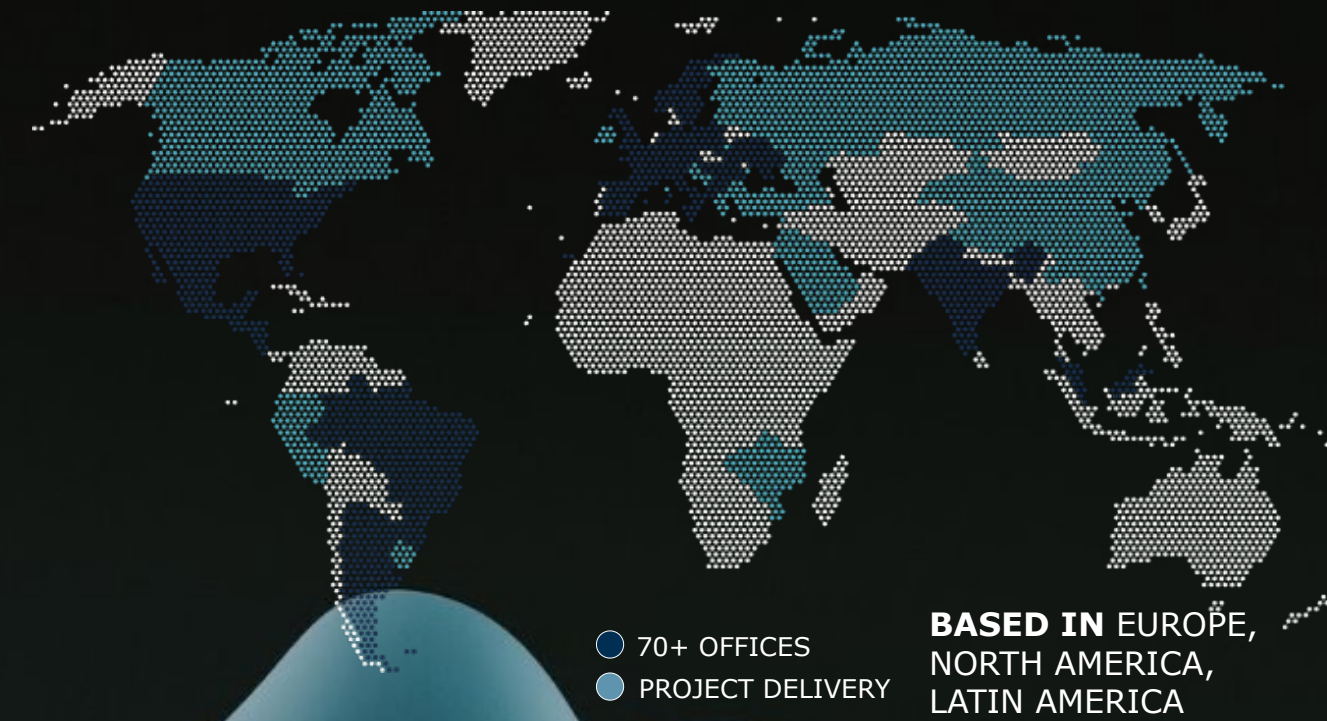


DISCOVER MORE

EMPLOYEES



CLIENTS



- + ADVISORY
- + TECHNOLOGY & IMPLEMENTATION
- + MANAGED SERVICES

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At a Glance

E-Health

We are transforming healthcare through a total digitalization of processes and leveraging innovative technologies to safely improve patient care, the quality of work of medical operators and the overall sustainability of the healthcare system.

900+
Professionals

25+
Years of
experience

180+
Clients

10+
Research
projects

€170m
+

Revenues
€35m Bookings
managed

1,2m Admissions
managed

4,5m Emergency
accesses

57m **MANAGED**
Laboratory tests
SERVICES

ADVISORY

TECHNOLOGY

PROPRIETARY SOLUTIONS

& IMPLEMENTATION

Our Proprietary Solutions

ellipse
E-Health Clinical
ecosystem platform
for clinical and care
dimensions

DE4Bios
Cloud
Biosurveillance
Platform

AREAS
E-Health
Integrated
Platform

Health
Governance
Prevention
Patient Journey
Privacy
EMR
LABORATORY
HIP
Patient Relationship
Pathway & Care
Continuity
VBHC
Clinical Decision Support System
CARE
CO-DESIGN
BOOKING
EMR
COLLABORATION
Accounting
Car

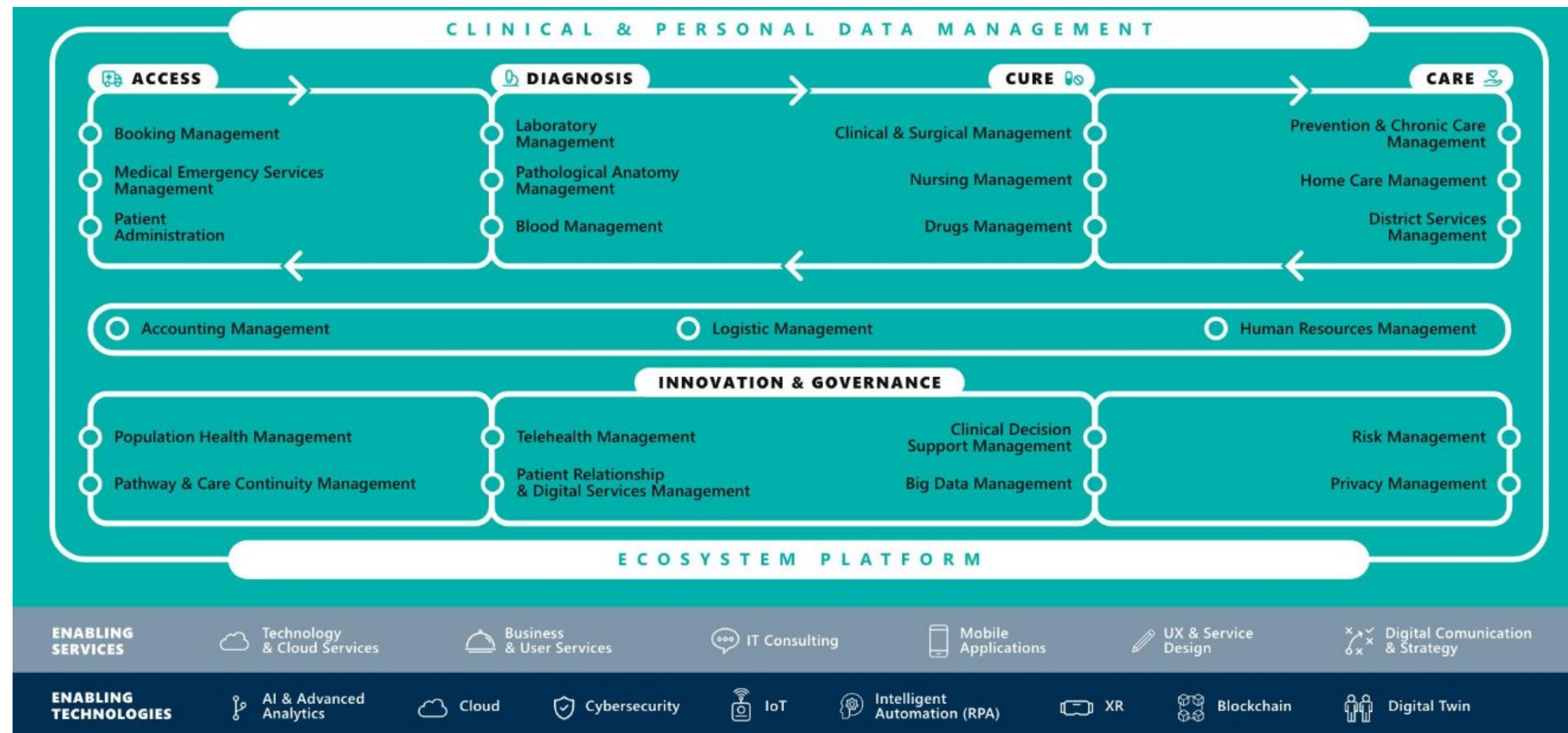
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At a Glance



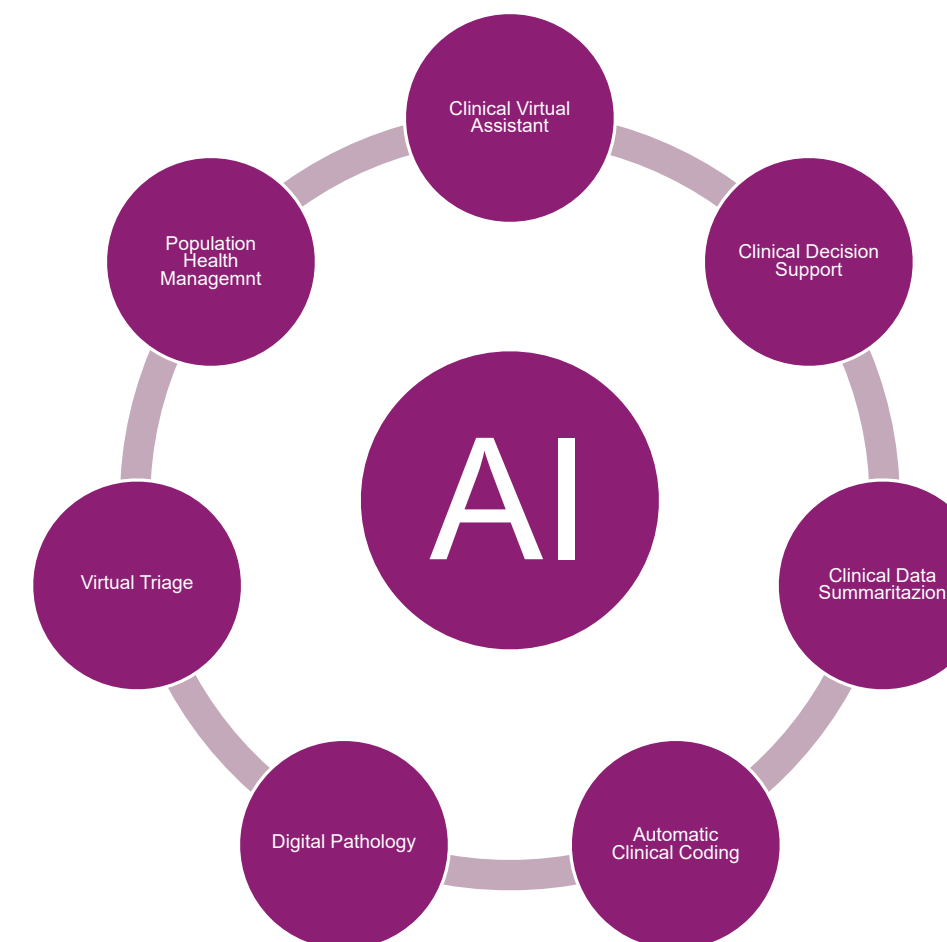
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Main Advantages of AI used in Healthcare Platform

Engineering, thanks to its deep expertise on the subject, is able to natively integrate AI within its solutions dedicated to healthcare pursuing different objectives, below are some examples of how AI is used today in our solutions



Main Advantages of AI used in Clinical Diagnosis

Artificial intelligence (AI) is revolutionizing the field of diagnostics, offering a range of benefits that translate into improved healthcare for patients.

Here are some benefits of improving diagnosis:

- **Increased accuracy:** AI can analyze large volumes of medical data, such as radiology images, medical records, and lab reports, with accuracy superior to human. This makes it possible to **identify patterns and abnormalities** that **may be missed by doctors**, leading to more **accurate and earlier diagnoses**.
- **Error reduction:** AI can help reduce human error, which is a significant cause of misdiagnosis. AI can act as a second check, identifying potential errors and flagging them to clinicians for review.
- **Faster diagnoses:** AI can process information much faster than humans, allowing for faster diagnoses. This is especially important for diseases that require timely intervention, such as cancer.



Engineering Vision of AI in Diagnostic Environment – Digital Pathology

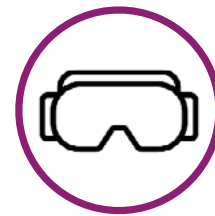
Today we will focus our attention on the Diagnostic field, more specifically **Digital Pathology**.

Our **goal** is to empower doctors by providing tools that enhance their **efficiency**, allowing them to focus on their core tasks while delegating time-consuming or automatable tasks to **artificial intelligence algorithms**.

Our strength lies in seamlessly integrating **Digital Pathology** into the traditional pathology workflow using a single unified system.

All in compliance with current regulations in the field of GDPR, AI Act and MDR certification.

The advantages of the Digital Pathology approach



Integrated vision

To view and annotate digital images in a built-in viewer



Clinical support

Features to support clinicians and optimize operations



Quality control

WSI Quality control



Image normalization

Normalizing the image to be analyzed using the viewer

Our focus is on both technology and users

For
Who

Clinical

AI algorithms within laboratory processes make operations **more efficient** with significant **time savings**.

Patients

Indirectly, patients can benefit from **faster hospital response times** and more **accurate diagnoses**.

AI/ML for DP Engineering's ecosystem

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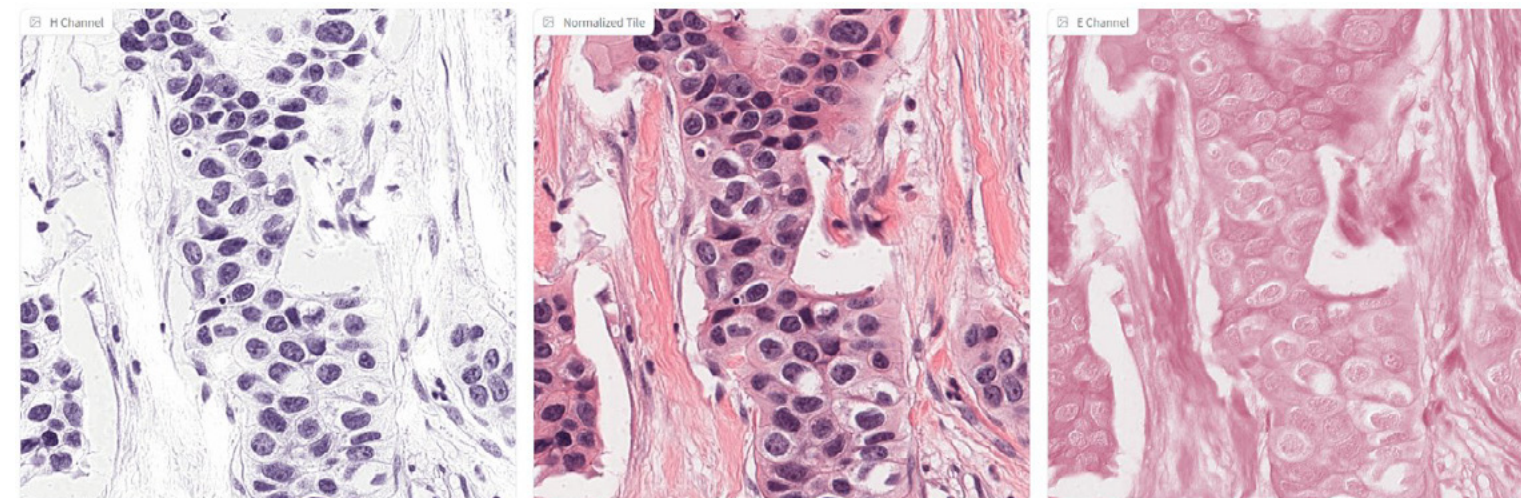
Some Algorithms Implemented

HEMATOXYLIN AND EOSIN SEPARATION

- By separating the hematoxylin and eosin channels, pathologists can visualize and analyze stained tissue structures more accurately and precisely.
- This allows them to identify specific cell types and distinguish between various tissue components, which is essential for making accurate diagnoses and determining appropriate treatment.



Clear identification of tissue characteristics

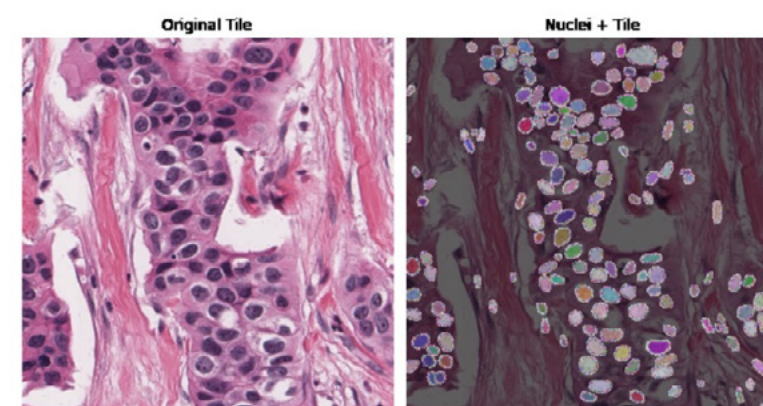


What are we implementing?

SEMANTIC OBJECT SEGMENTATION

- Implementation of an object detection ML algorithm for 2D and 3D images
- Artificial vision system to measure and count objects
- Focus to shift from qualitative to quantitative vision

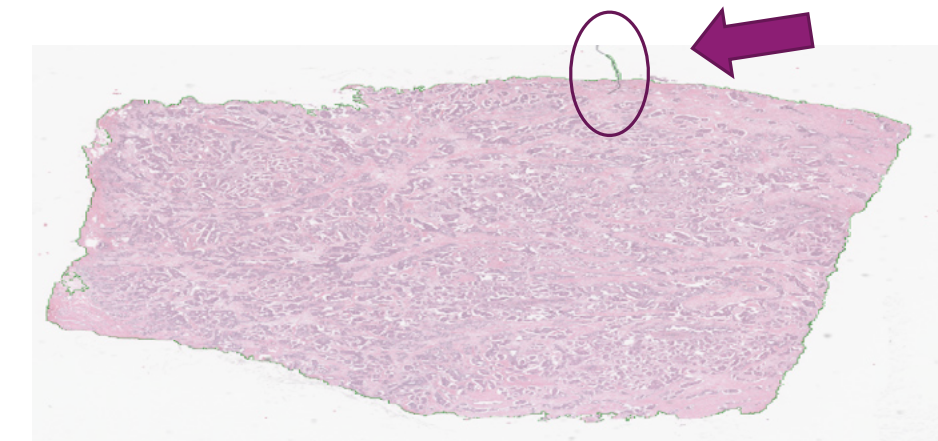
Reduce the time dedicated to the physician's counting activities



DATA INTEGRITY AND IMAGE QUALITY

- Study of the main issues for which the slide should be discarded
- Detection of bubbles, broken glass, and foreign objects within the slide
- Edge detection to distinguish tissue from the background

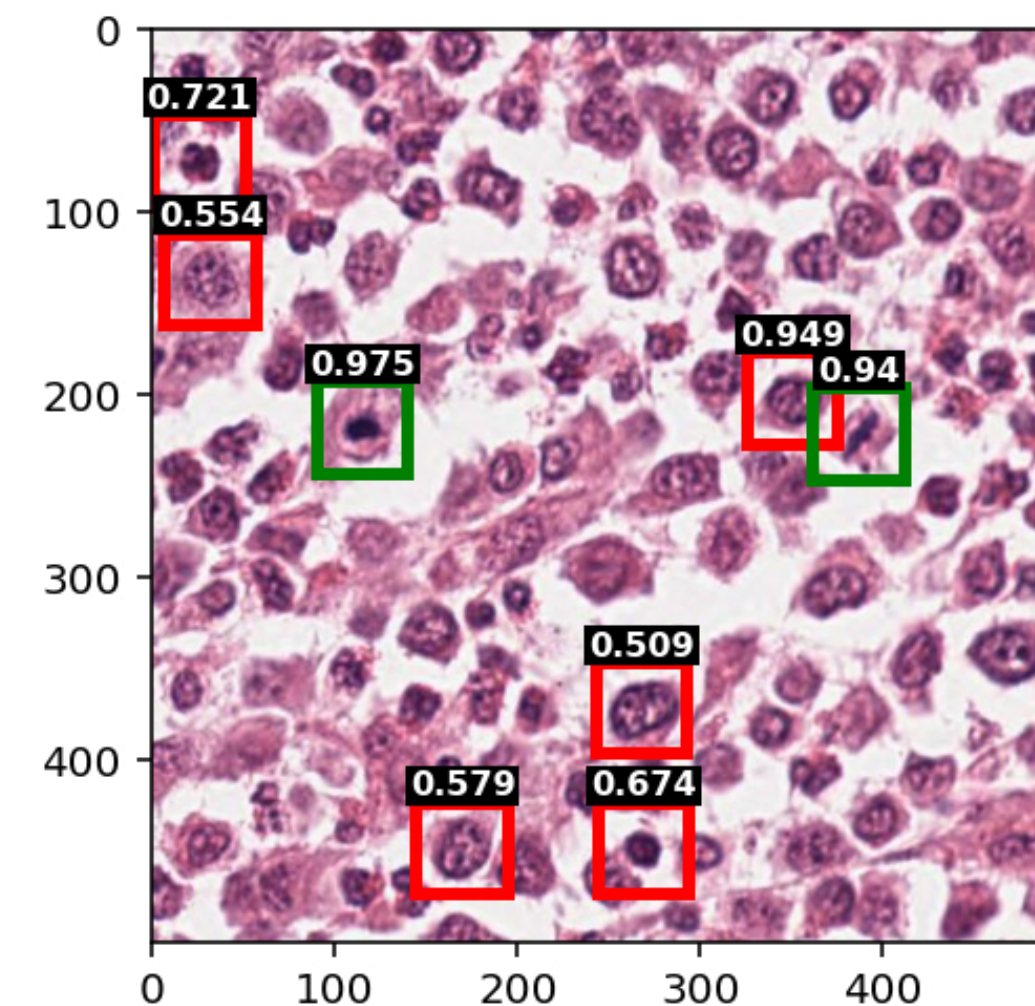
Early identification of poor quality/damaged images



What are we implementing?

MITOTIC NUCLEI DETECTION

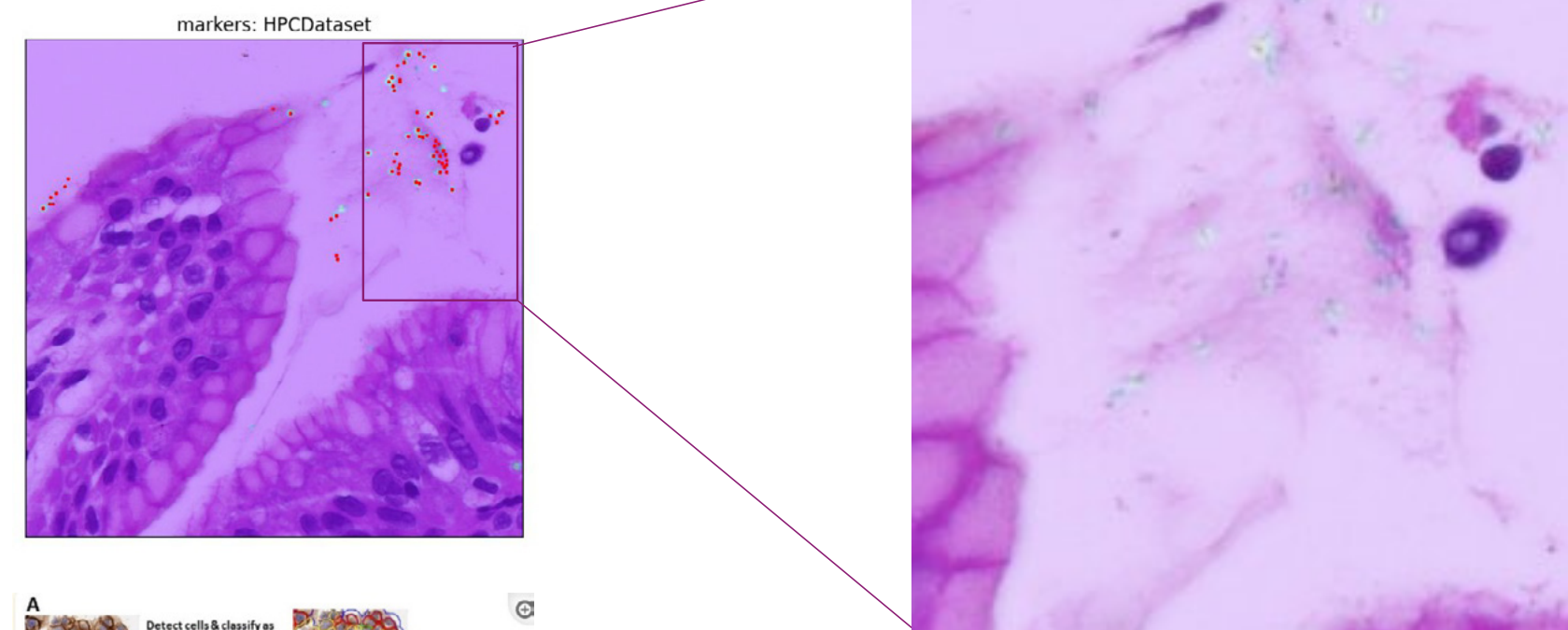
- Mitotic count is an important component of tumor classification as it provides information on the rate of cell division and tumor growth. Therefore, accurate detection of mitotic nuclei is essential for correct tumor classification, ensuring that the extracted information is accurate and reliable.
- Manual detection of mitotic nuclei is time-consuming and subject to inter-observer variability, which can lead to inconsistencies in tumor diagnosis and classification. Additionally, human experts might miss some mitotic events, especially in large tissue samples. This can improve the efficiency and productivity of pathology laboratories, reduce costs, and increase access to pathology services.



Decision Support System

Helicobacter Pylori Detection

Creation of a neural network to detect the presence of Helicobacter Pylori (HP)

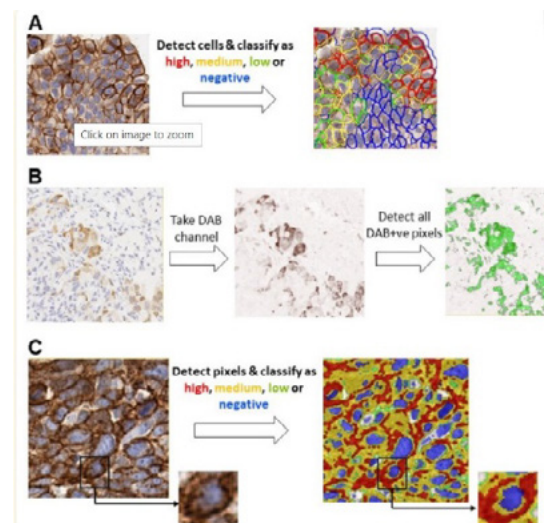


Object Scoring IHC

Algorithm H-score

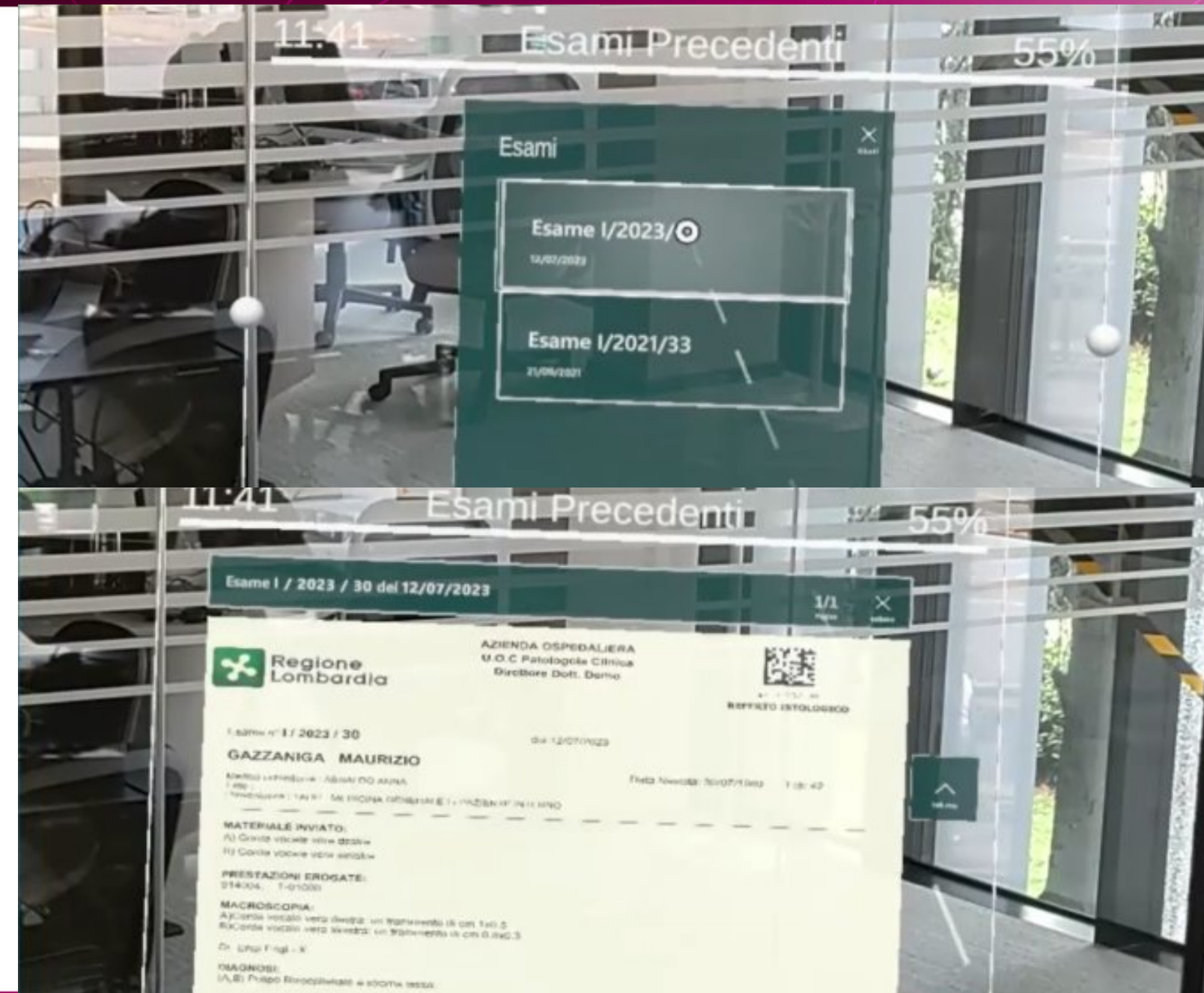
ATM Score

Algorithm pixH-score



Big Data & XR

- Big Data for the creation of multidisciplinary databases that are easily queryable and usable by clinicians
- XR to provide the pathologist with all the information and tools needed to improve the workflow within the laboratory



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Thanks for your attention



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Tech Strategy Senior Manager
Innovation of Public Sector & Healthcare



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Delitti in materia di violazione del diritto d'autore (Art. 25-novies, D.Lgs. n. 231/2001) [articolo aggiunto dalla L. n. 99/2009]

- Messa a disposizione del pubblico, in un sistema di reti telematiche, mediante connessioni di qualsiasi genere, di un'opera dell'ingegno protetta, o di parte di essa (art. 171, legge n.633/1941 comma 1 lett. a) bis)
- Reati di cui al punto precedente commessi su opere altrui non destinate alla pubblicazione qualora ne risulti offeso l'onore o la reputazione (art. 171, legge n.633/1941 comma 3)
- Abusiva duplicazione, per trarne profitto, di programmi per elaboratore; importazione, distribuzione, vendita o detenzione a scopo commerciale o imprenditoriale o concessione in locazione di programmi contenuti in supporti non contrassegnati dalla SIAE; predisposizione di mezzi per rimuovere o eludere i dispositivi di protezione di programmi per elaboratori (art. 171-bis legge n.633/1941 comma 1)
- Riproduzione, trasferimento su altro supporto, distribuzione, comunicazione, presentazione o dimostrazione in pubblico, del contenuto di una banca dati; estrazione o reimpiego della banca dati; distribuzione, vendita o concessione in locazione di banche di dati (art. 171-bis legge n.633/1941 comma 2)
- Abusiva duplicazione, riproduzione, trasmissione o diffusione in pubblico con qualsiasi procedimento, in tutto o in parte, di opere dell'ingegno destinate al circuito televisivo, cinematografico, della vendita o del noleggio di dischi, nastri o supporti analoghi o ogni altro supporto contenente fonogrammi o videogrammi di opere musicali, cinematografiche o audiovisive assimilate o sequenze di immagini in movimento; opere letterarie, drammatiche, scientifiche o didattiche, musicali o drammatico musicali, multimediali, anche se inserite in opere collettive o composite o banche dati; riproduzione, duplicazione, trasmissione o diffusione abusiva, vendita o commercio, cessione a qualsiasi titolo o importazione abusiva di oltre cinquanta copie o esemplari di opere tutelate dal diritto d'autore e da diritti connessi; immissione in un sistema di reti telematiche, mediante connessioni di qualsiasi genere, di un'opera dell'ingegno protetta dal diritto d'autore, o parte di essa (art. 171-ter legge n.633/1941)
- Mancata comunicazione alla SIAE dei dati di identificazione dei supporti non soggetti al contrassegno o falsa dichiarazione (art. 171-septies legge n.633/1941)
- Fraudolenta produzione, vendita, importazione, promozione, installazione, modifica, utilizzo per uso pubblico e privato di apparati o parti di apparati atti alla decodificazione di trasmissioni audiovisive ad accesso condizionato effettuate via etere, via satellite, via cavo, in forma sia analogica sia digitale (art. 171-octies legge n.633/1941).

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