

Artificial Intelligence in Digital Pathology

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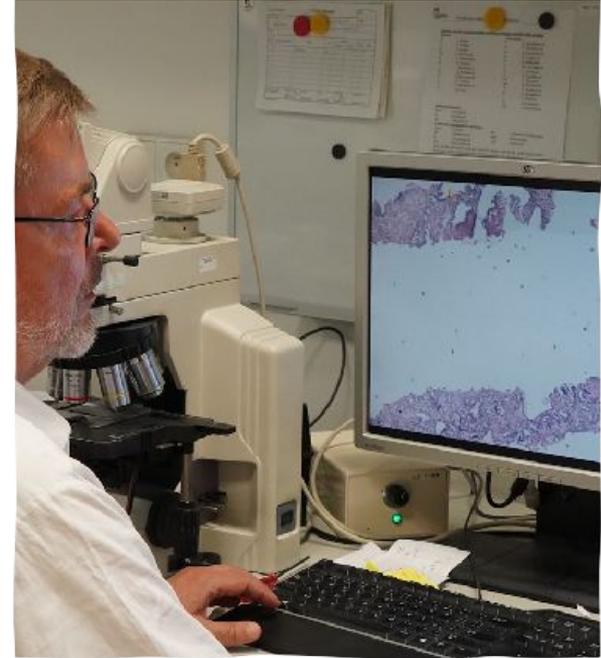
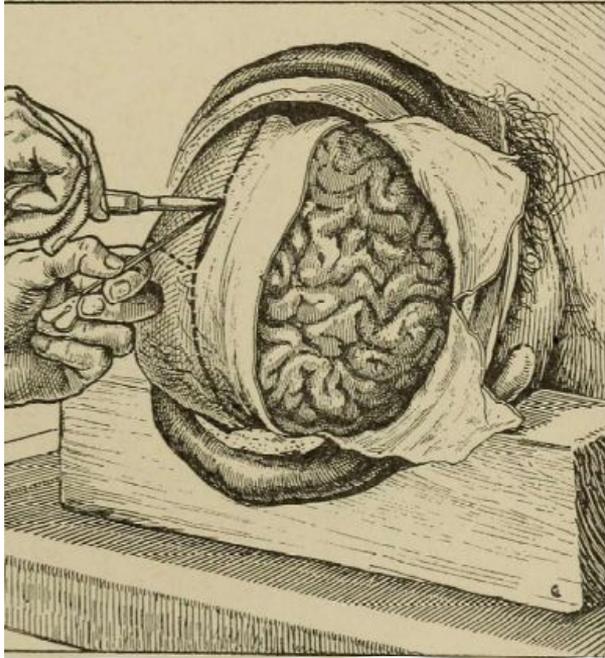


RationAI

MUNI

MO
U Masarykův
onkologický
ústav

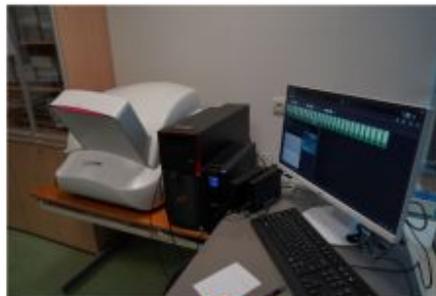
Evolution of Pathology



... from cutting dead bodies to advanced diagnostics

What pathologists do?

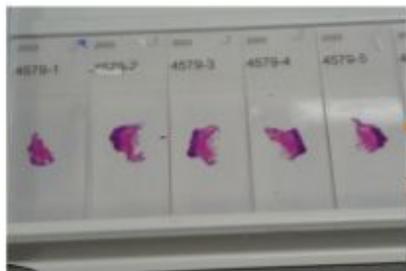
Scanner



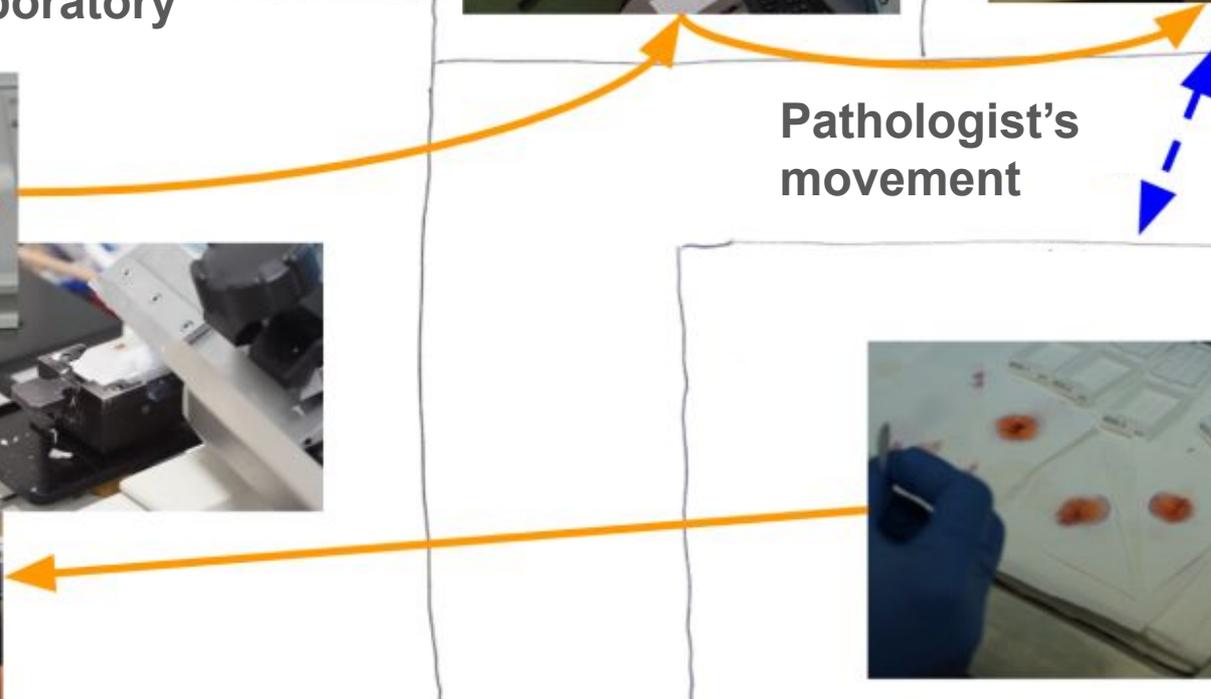
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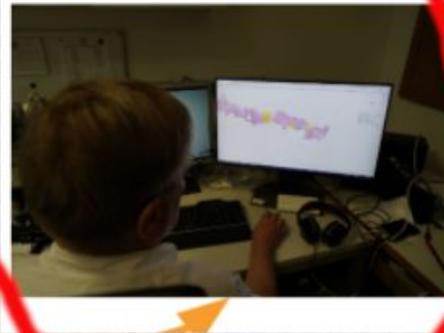
Laboratory



Pathologist's movement

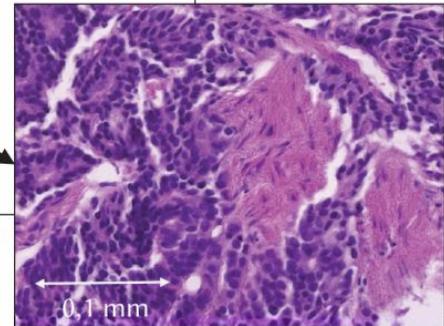
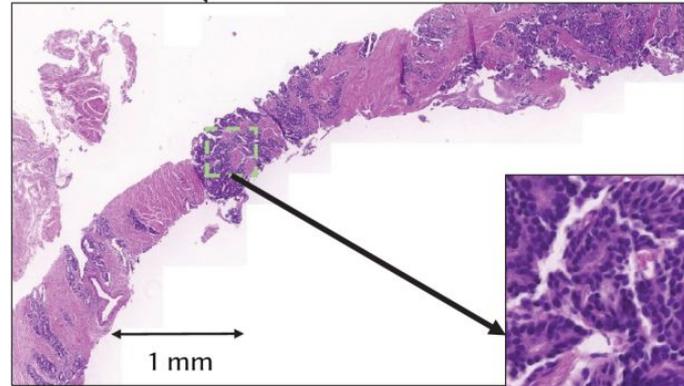
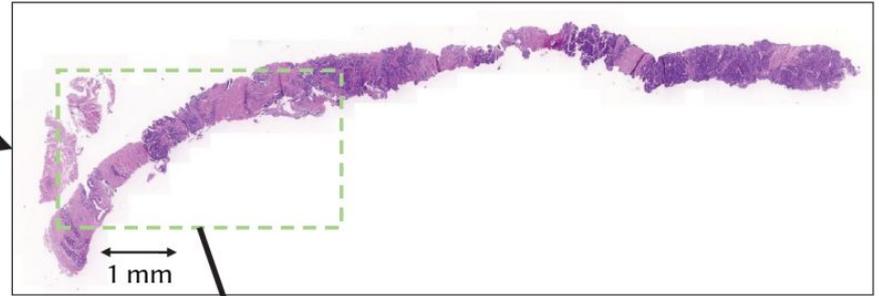
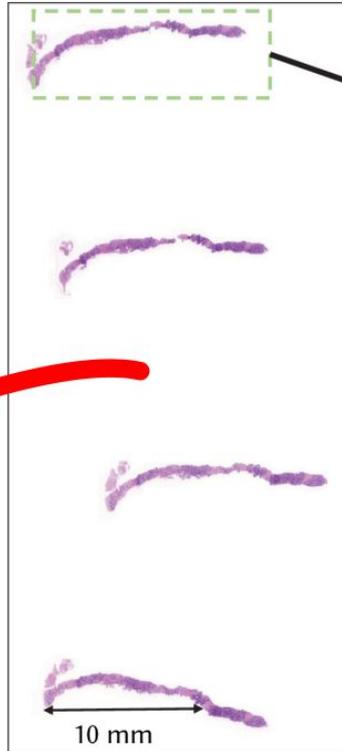


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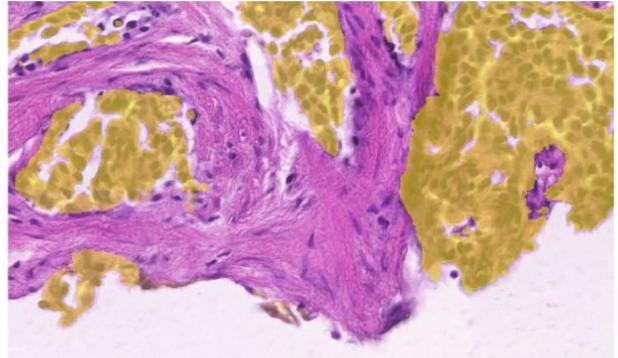
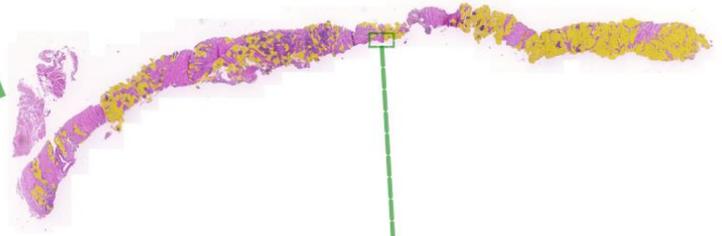
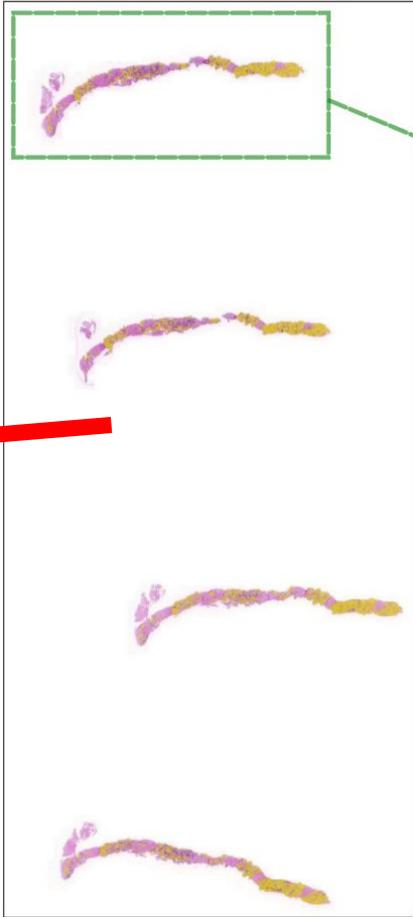


Here AI possibly helps
... a little

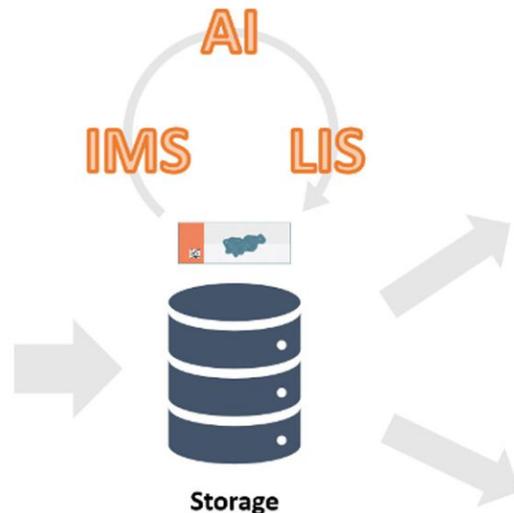
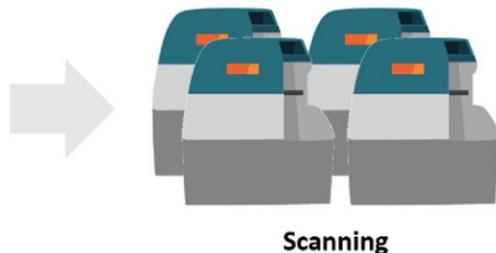
What a pathologist sees?



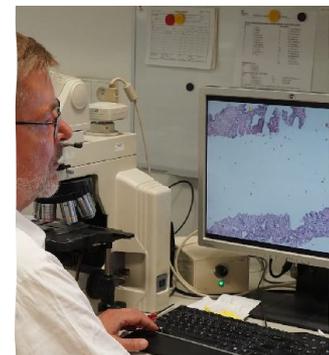
AI power!!



Digital pathology

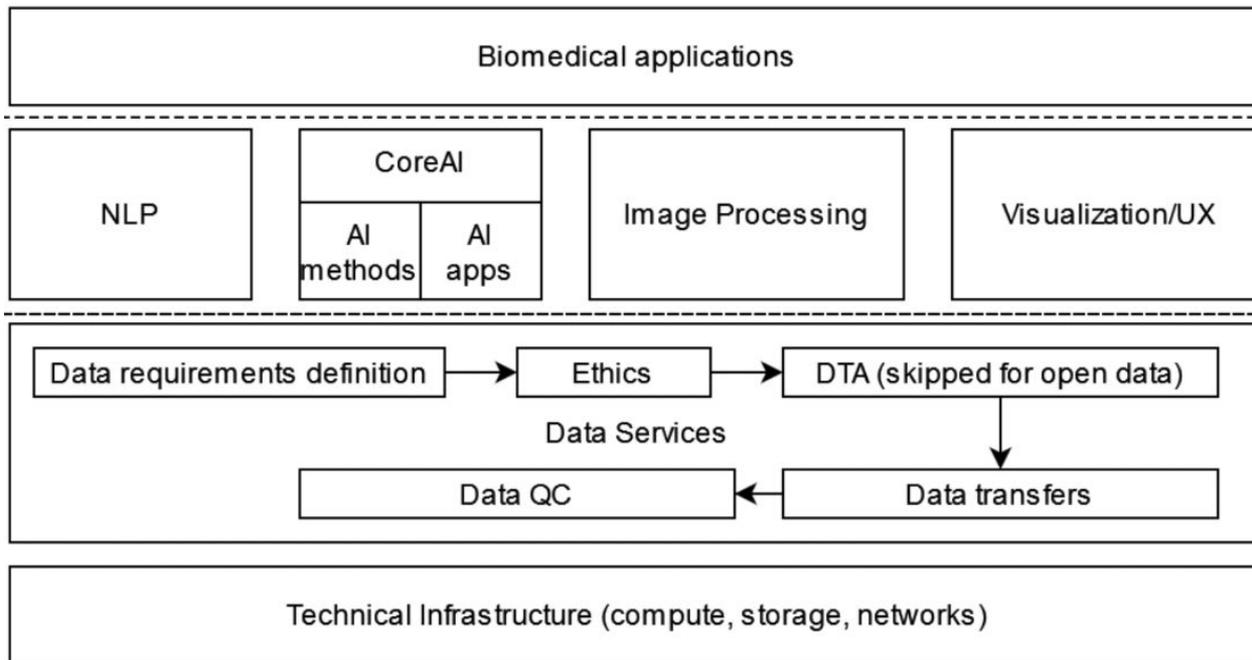


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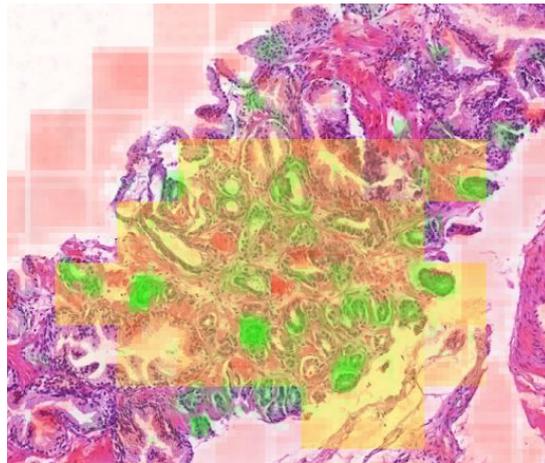
**M U N I
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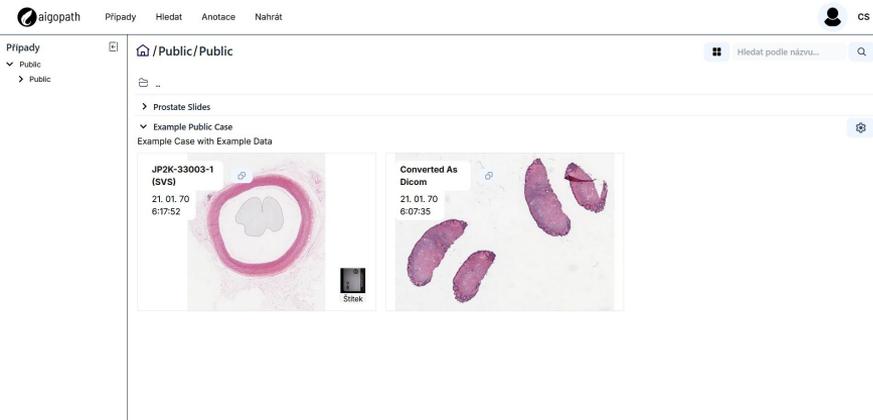


Some results of RationAI

Cancer segmentation

- *Prostate, breast, colon* tumor segmentation
- Explainable AI
- Using foundation models
Prov-GigaPath, etc.
- Tested on multi-centric data





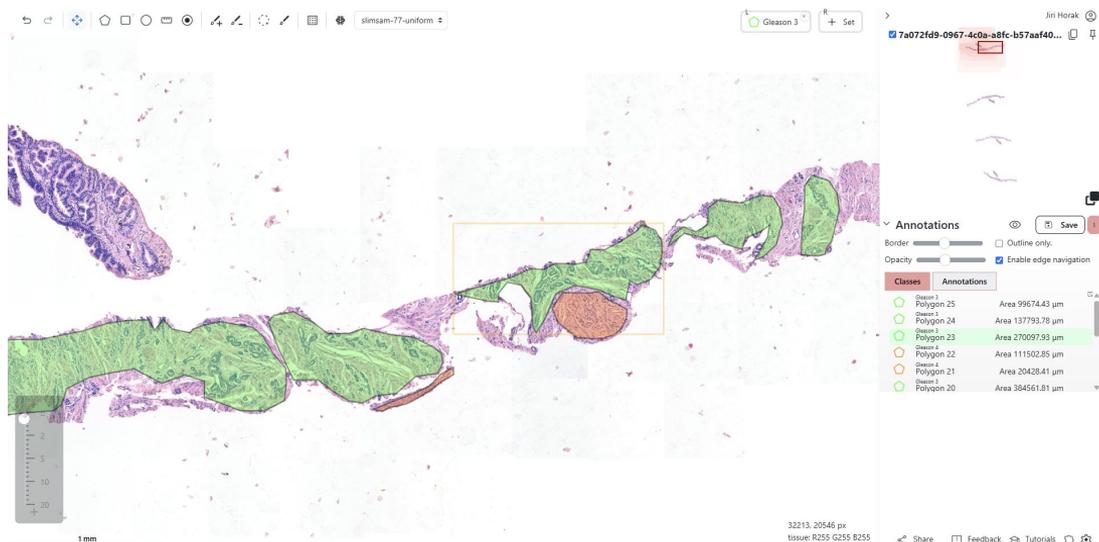
Our deployment at MMCI

Case browser

- Execution of AI models
- Metadata examination
- Can be substituted by LIS

xOpat viewer

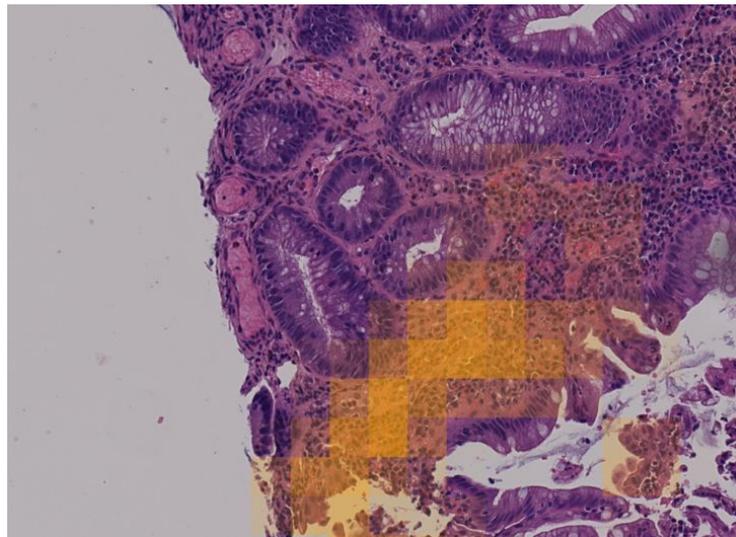
- Fast and reliable
- Advanced visualization of AI outputs, annotations
- Measurements, morphometry



Inflammatory Bowel Disease

Ulcerative colitis - Nancy index

- Thousands of WSI from several hospitals, no detailed annotations
- Difficult problem
 - Vaguely defined Nancy levels
 - Cell nuclei level as well as large structures



Conclusions

- Research in AI in digital pathology in Brno, Czech Republic
- Computer science department at MUNI
(approx 10 senior members, around 30 students)
- Several hospitals, including the prominent research institutions in Czech Rep. such as MMCI, IKEM

- Full stack: From experimental models and research in XAI, through infrastructure development, to deployment in hospitals
- Expecting the agentic AI coming!