Applications of Artificial Intelligence in Medicine (survey)

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Outline

1 **From Our Lab**
- Color X-ray
- Image DB Search

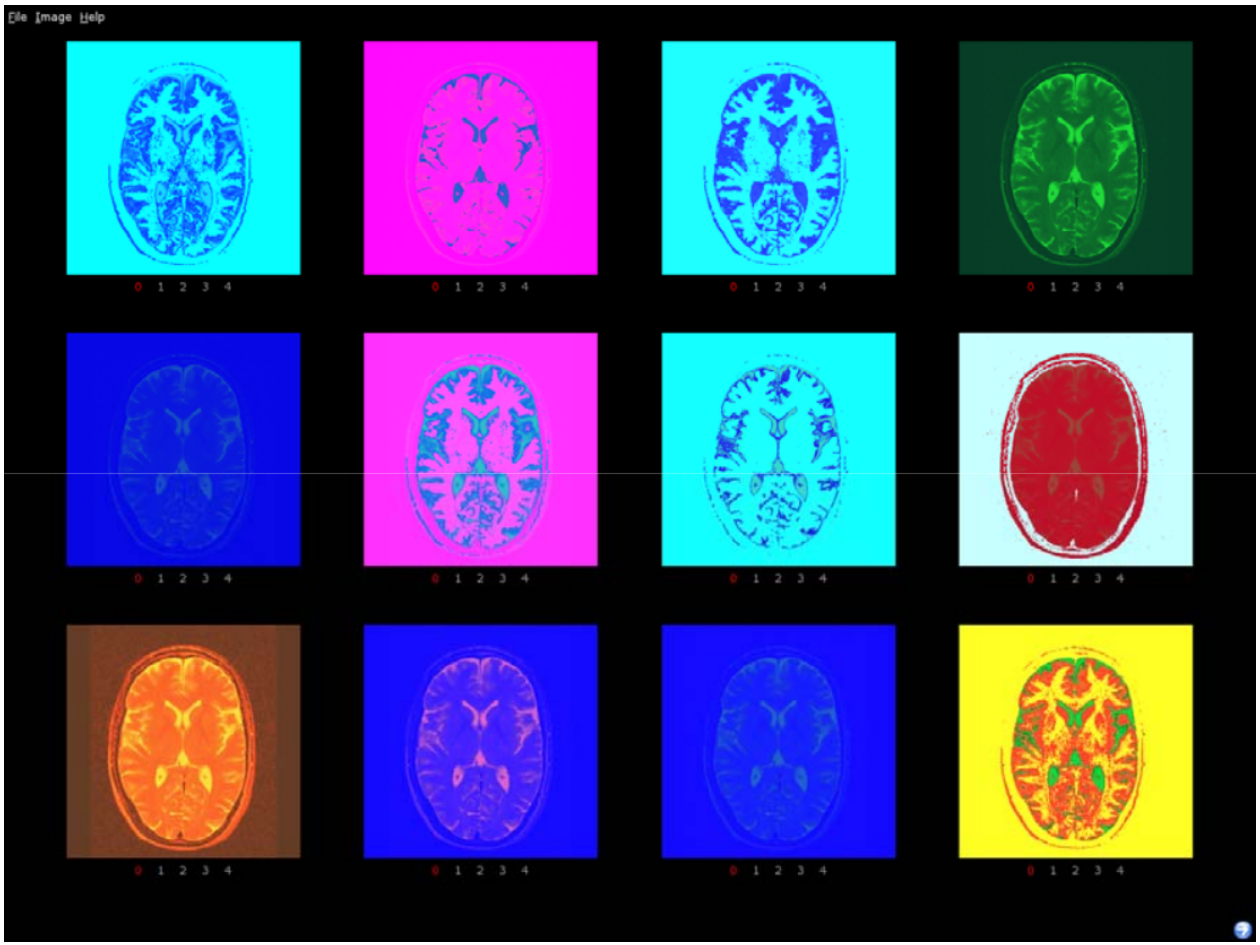
2 **Web research**
- Big AI Systems
- Academia
- Trends

3 **Conclusion**

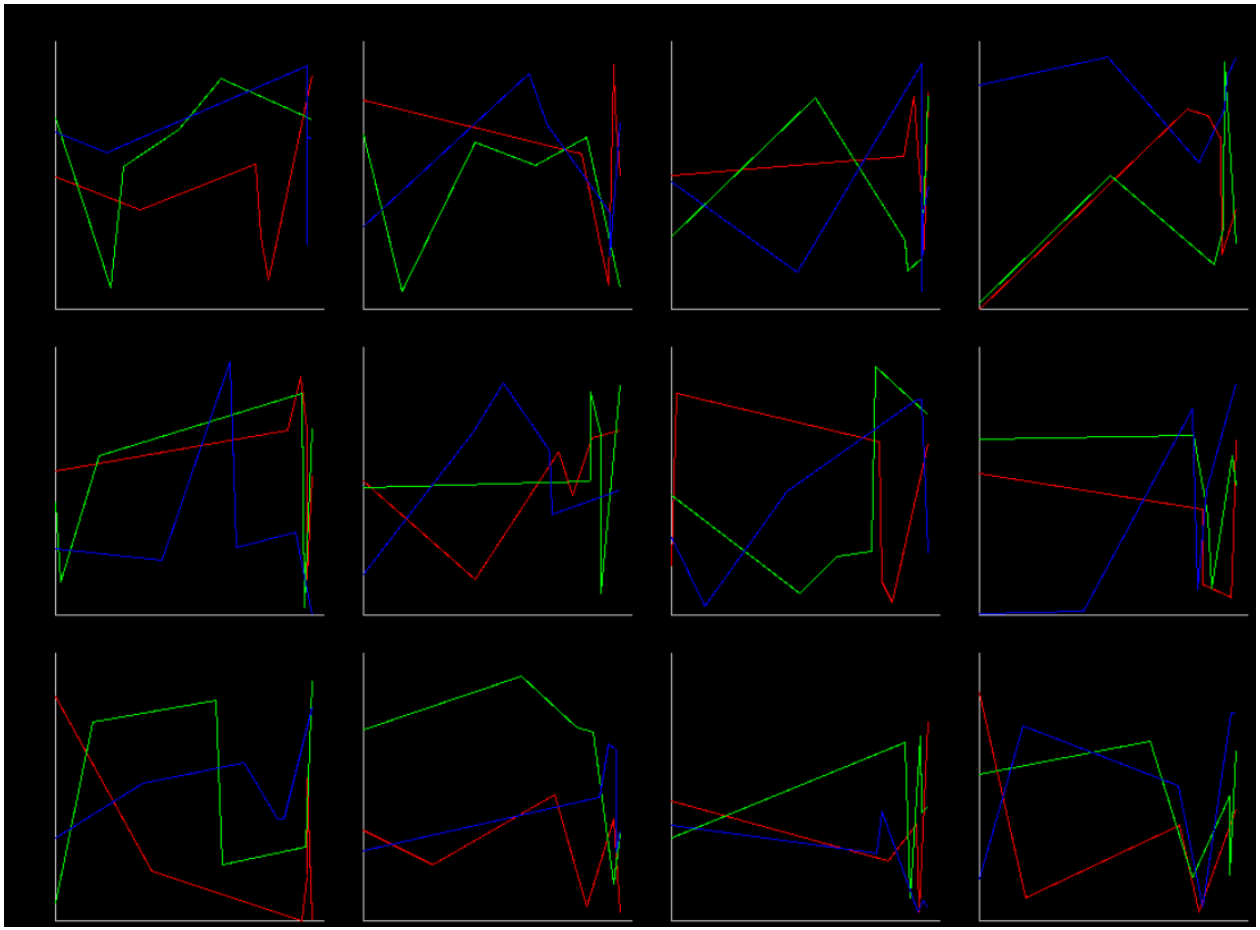
Examples of Medical Artificial Intelligence Applications from Our Lab

- Neupauer: Interactive Evolution of Color in X-ray Images
- Frančák: Interactive Image Database Search

Neupauer: Interactive Evolution of Color in X-ray Images



Neupauer: Interactive Evolution of Color in X-ray Images

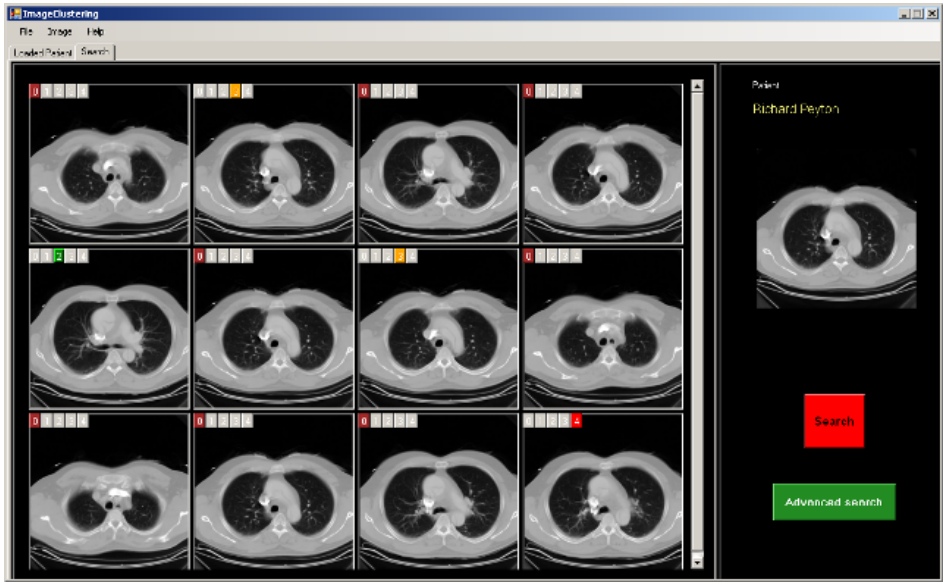


Neupauer: Interactive Evolution of Color in X-ray Images

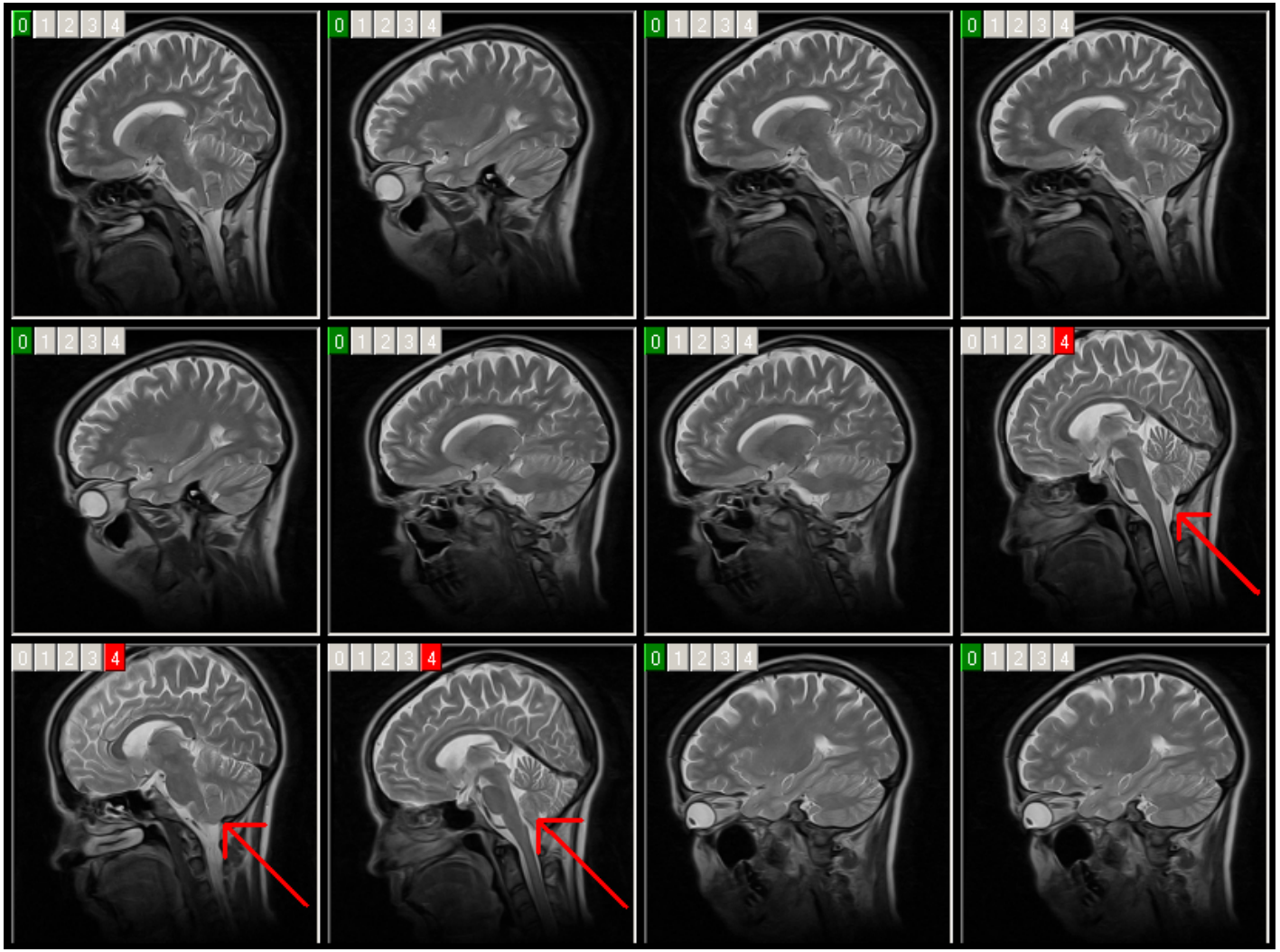
- AI method: Interactive Evolutionary Computation
- Programming: Image processing, DICOM format
- Conclusion:

> *"If doctor will focus on concrete structure, optimization is quick."*
>
> *Dr.Kossuth*

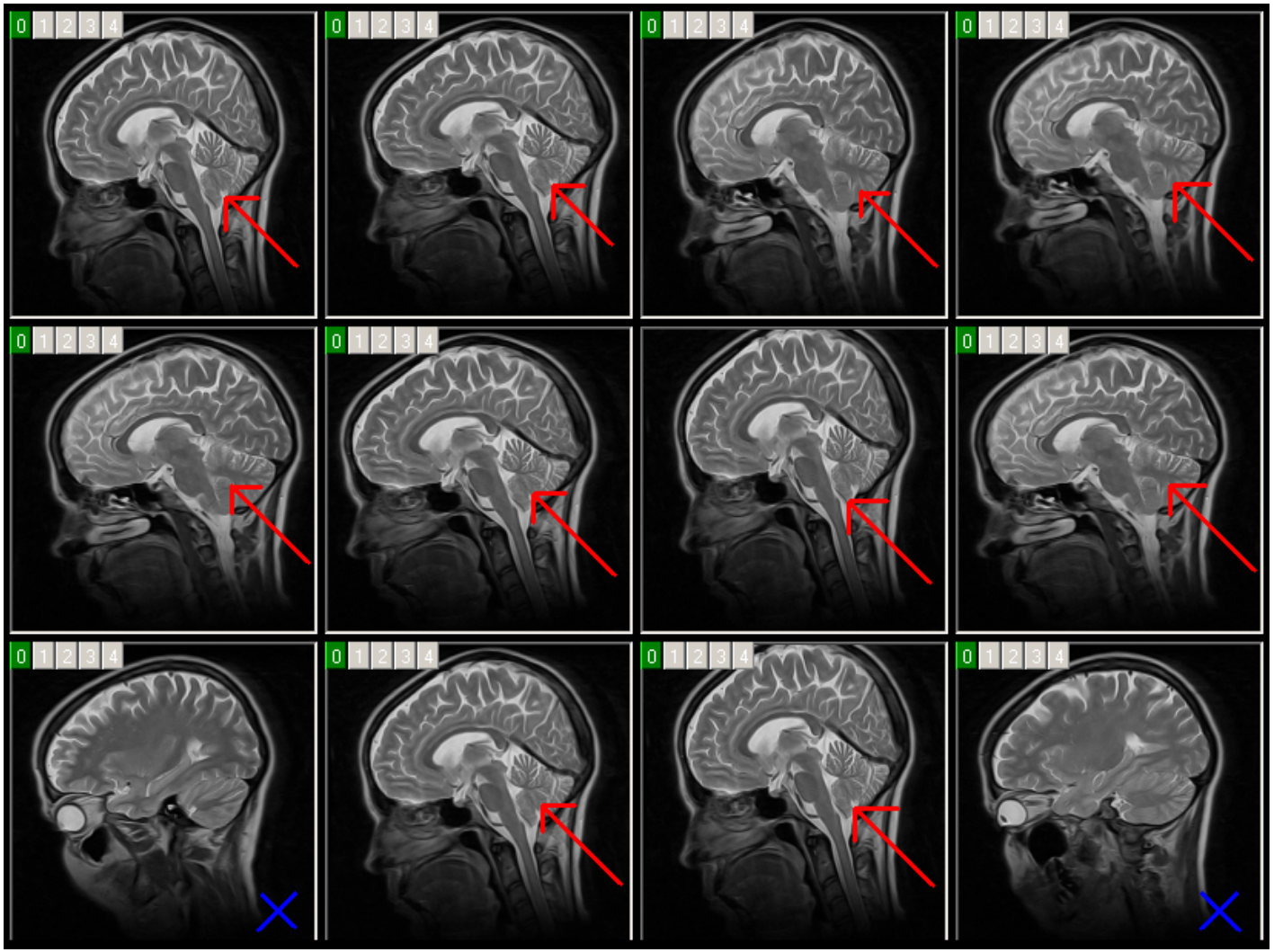
Frančák: Interactive Image Database Search



Frančák: Interactive Image Database Search



Frančák: Interactive Image Database Search



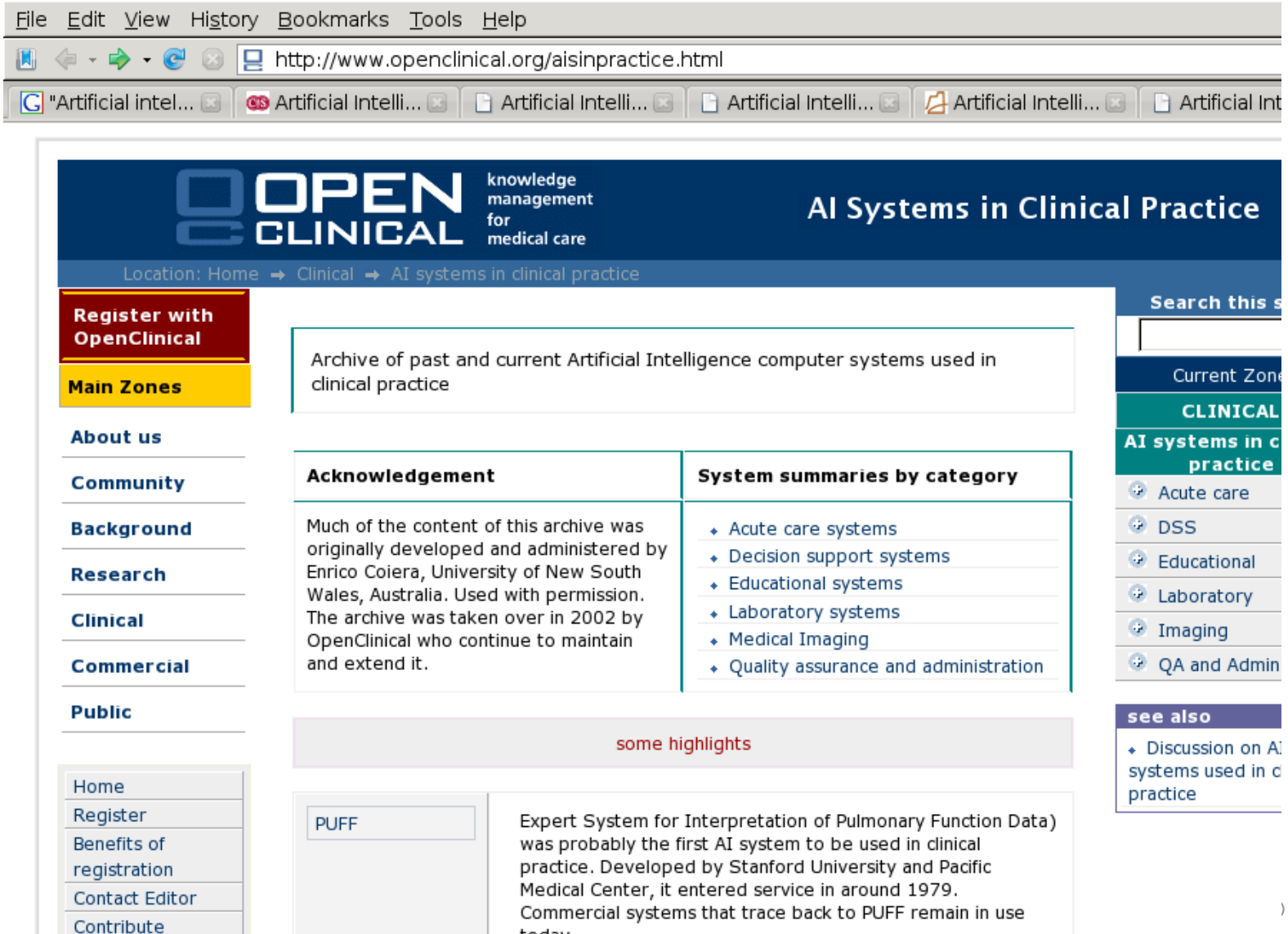
Frančák: Interactive Image Database Search

- AI methods:
  - Self-Organizing Maps
  - Interactive Evolutionary Computation
- Conclusion:
  - this approach may work,
  - will help doctor to elaborate annual reports from his archive,
  - in shared hospital databases: to compare diagnoses

Web Research

- Big AI Systems in Clinical Practice
- Artificial Intelligence in Medicine (journal)
- Medical Informatics Conferences
- Trends in AI in Medicine presence on internet

Survey: AI Systems in Clinical Practice



Survey: AI Systems in Clinical Practice

- Acute care systems (8) 1987-2004
- Decision support systems (23) 1981-2003
- Educational systems (3) 1989-2002
- Laboratory systems (14) 1987-1996
- Medical Imaging (3)
- Quality assurance and administration (8) 1989-1995

Elsevier Journal: Artificial Intelligence in Medicine

- AI-based clinical decision making
- medical knowledge engineering
- knowledge-based and agent-based systems
- computational intelligence in bio- and clinical medicine
- intelligent medical information systems
- AI in medical education
- intelligent devices and instruments
- automated reasoning and metareasoning in medicine
- methodological, philosophical, ethical, and social issues of AI in medicine

(Current Contents/Clinical Medicine)

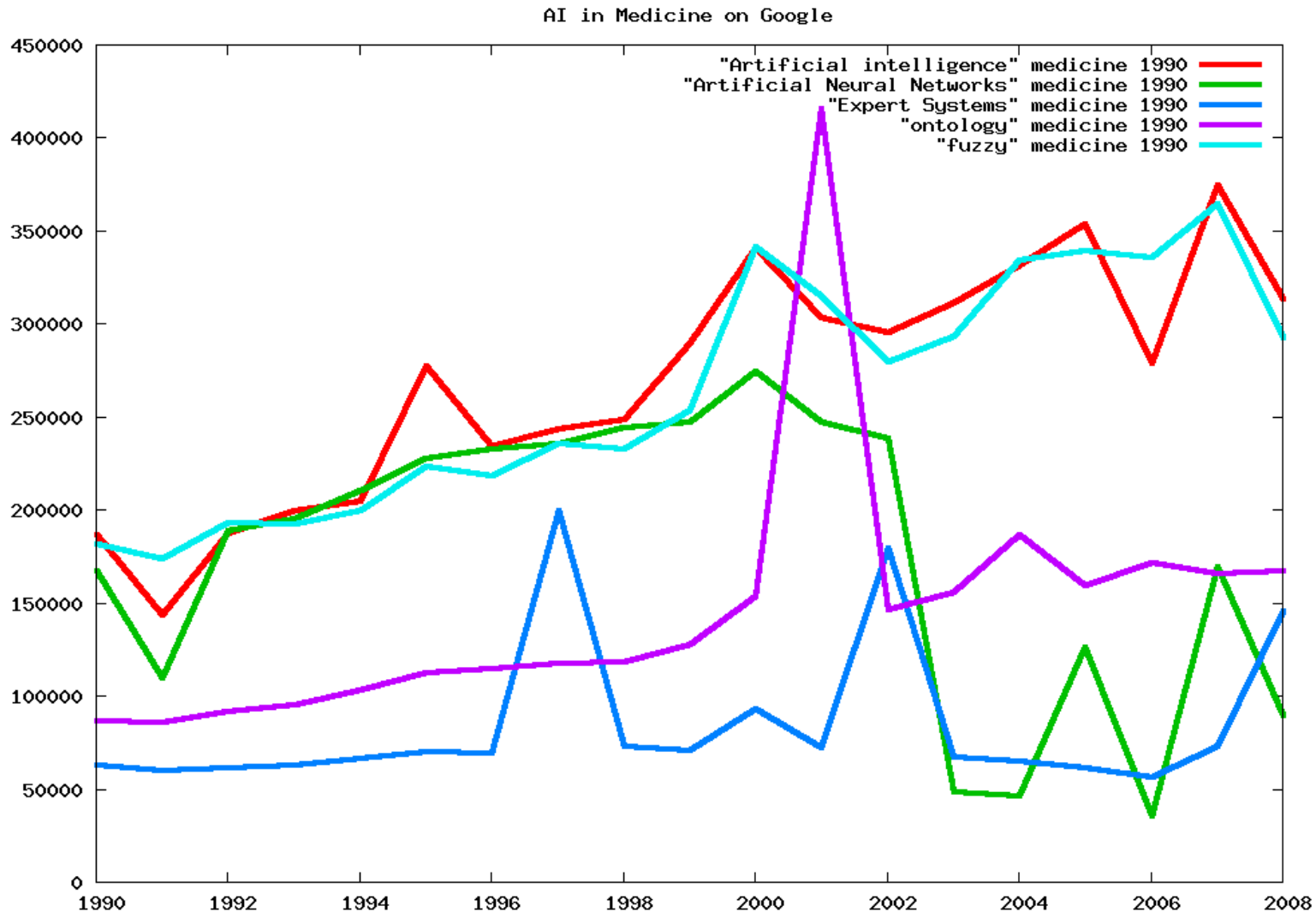
Medical Informatics Conferences

- AIME 2008: Conference on Artificial Intelligence in Medicine,
- AMIA 2008: Aerican Medical Informatics Association 2008 Annual Symposium,
- CBMS 2008: IEEE International Symposium on Computer-Based Medical Systems,
- EMBC 2008: The Annual International Conference of the IEEE Engineering in Medicine and Biology Society,
- MedInfo 2008: World Congress on Health (Medical) Informatics

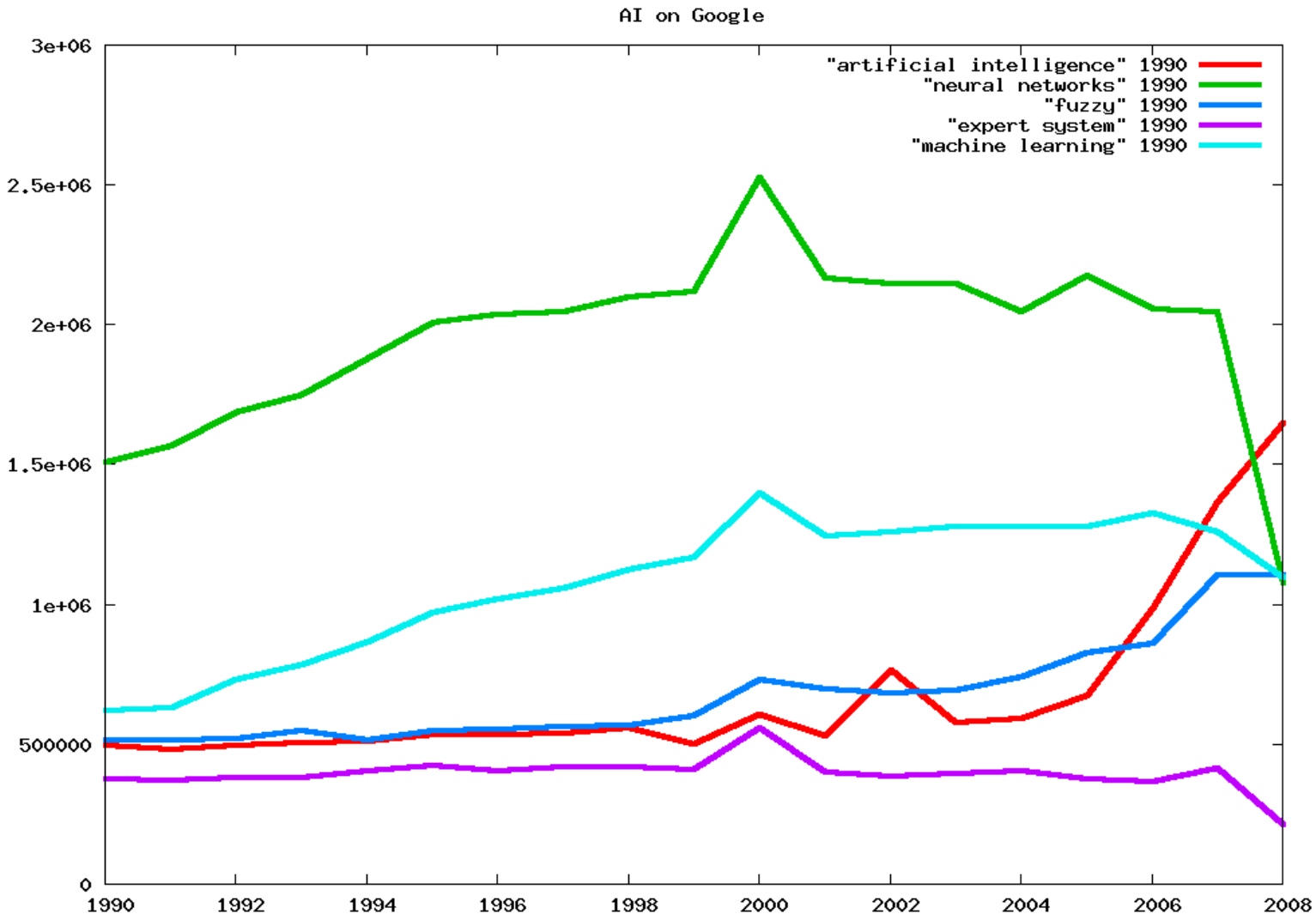
AIME 2007: Sessions

- Agent-based systems
- Temporal Data Mining
- Machine learning and KDD
- Text Mining, Natural language processing and generation
- Ontologies
- Decision Support Systems
- Applications of AI-based Image Processing
- Guidelines
- Workflow Systems

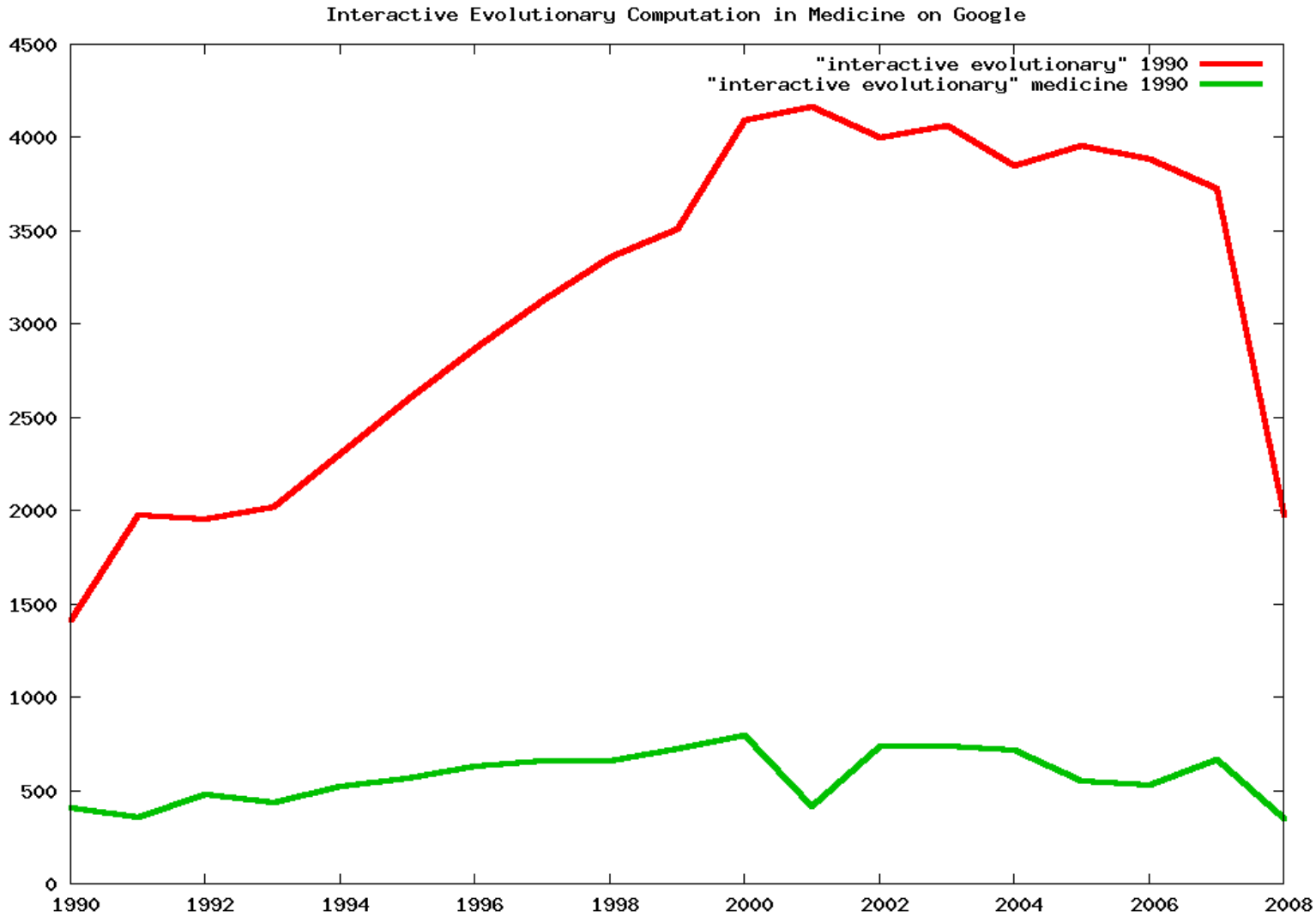
AI in Medicine on Google



AI on Google


AI on Google
"artificial intelligence" 1990
"neural networks" 1990
"fuzzy" 1990
"expert system" 1990
"machine learning" 1990
3e+06
2.5e+06
2e+06
1.5e+06
1e+06
500000
0
1990
1992
1994
1996
1998
2000
2002
2004
2006
2008

IEC in Medicine



Conclusion

- AI in Medicine – stable research area
- AI research – slow progress
- Established:
  - specialized journals,
  - conferences,
  - research topics