Deep Learning for human level AI in radiology

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Teratec AI-HPC

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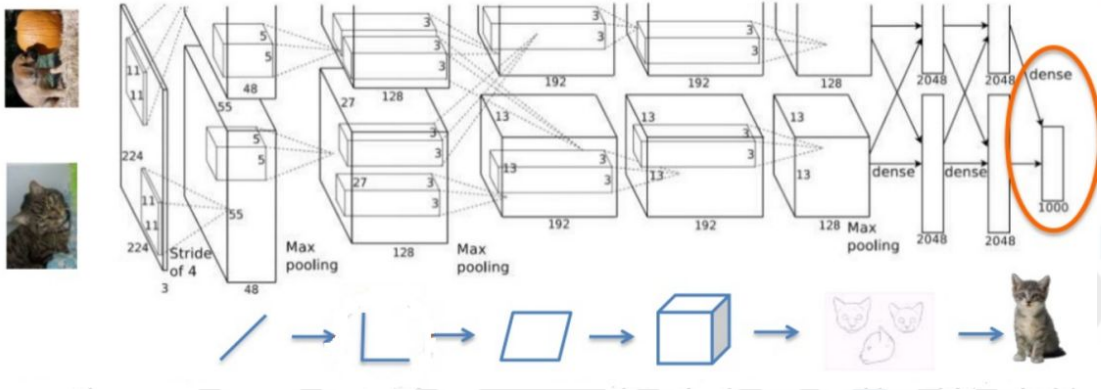
Deep Learning (r)evolution



- incremental research improvements + GPGPU
- Neural Net - a smooth differentiable object connecting input and output
- phase transition for several problems = human level perf

BUT:

- usually needs a lot of problem-specific (!) data
- still demands a lot of work of highly skilled programmers
- AND specialists from the target domain
- for a qualitatively new data: no guarantees you get your solution in X time.

DL = internal combustion engine, specific model = car/truck

In our approach, limited by several factors. Actually 3-5 times higher

- Resolution: 1200x800 **vs** 224x224
- Zone of Interest : < 1% **vs** > 50%
- Number of classes : 2 **vs** 1000
- Highly imbalanced **vs** roughly balanced
- Exact data and problem matter

Zone of Interest →

Examples of emerging DL applications

- Autonomous vehicles : impacts numerous industries
- Chatbots : virtual assistants, low level HR functions
- eCommerce : salesmen, consultants
- Logistics : from Amazon to international cargo hubs management

Image credit: viatech.com

Image credit: Image by chuttersnap by Unsplash

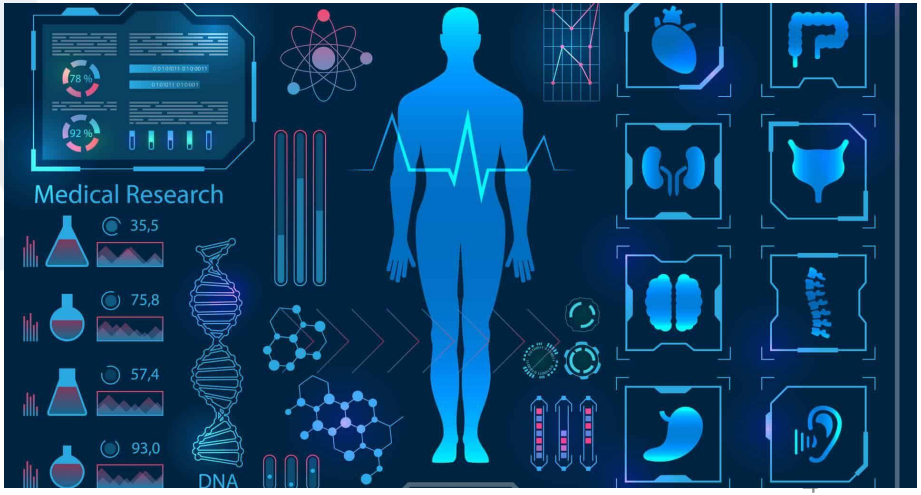


Image credit: lotus-qa.com

Therapixel: AI-augmented radiology

Mammscreen

Clinical Study
Therapixel Cloud

2013 — Founded

2015 — Visualization SW

2016 — AI research

2017 — 5th place Kaggle Data Bowl

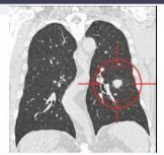
2018 — 1st place DREAM DM

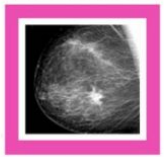
2019 — MammoScreen deployed

2020

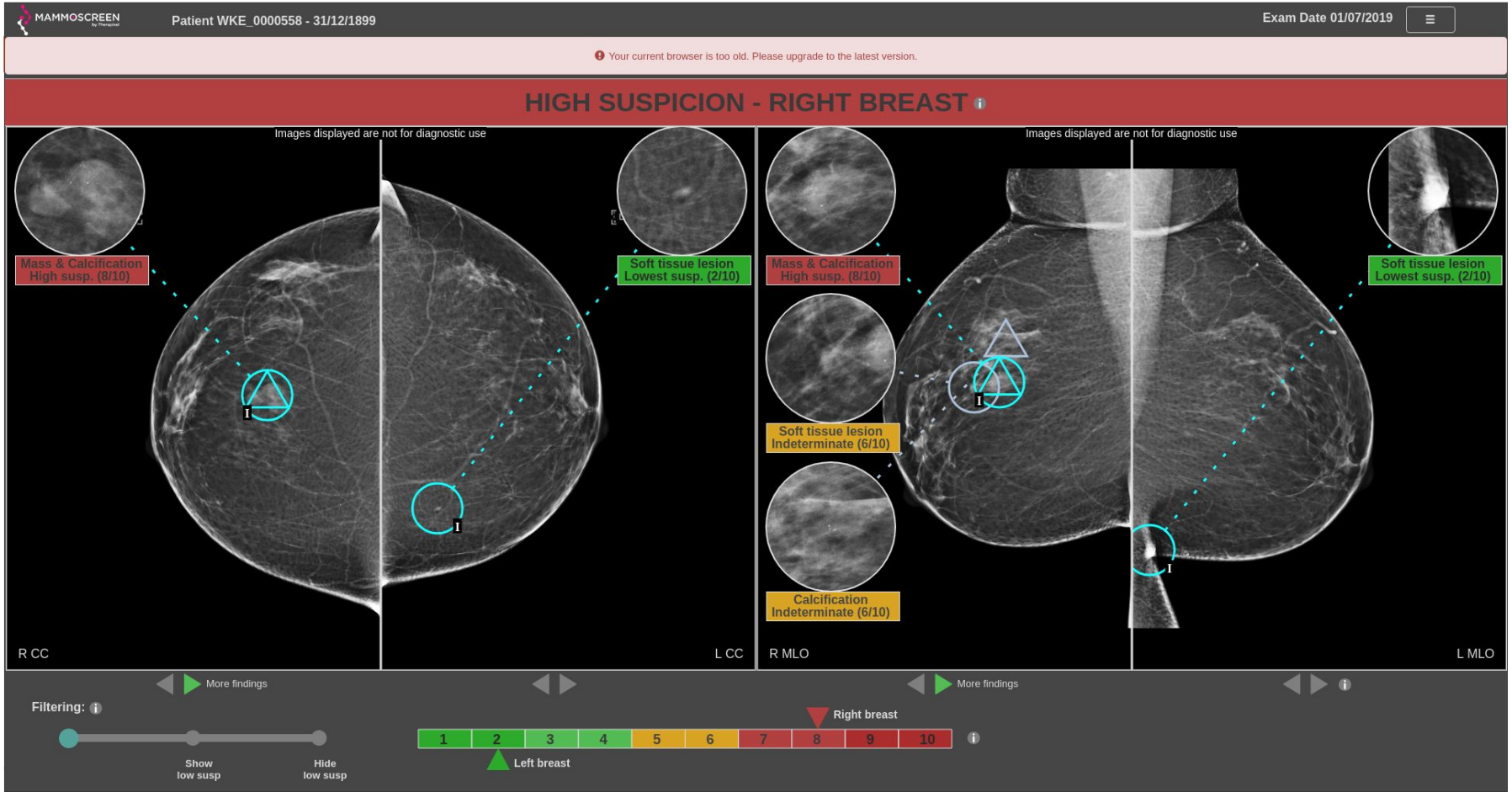
Olivier Clatz, PhD

Pierre Fillard, PhD

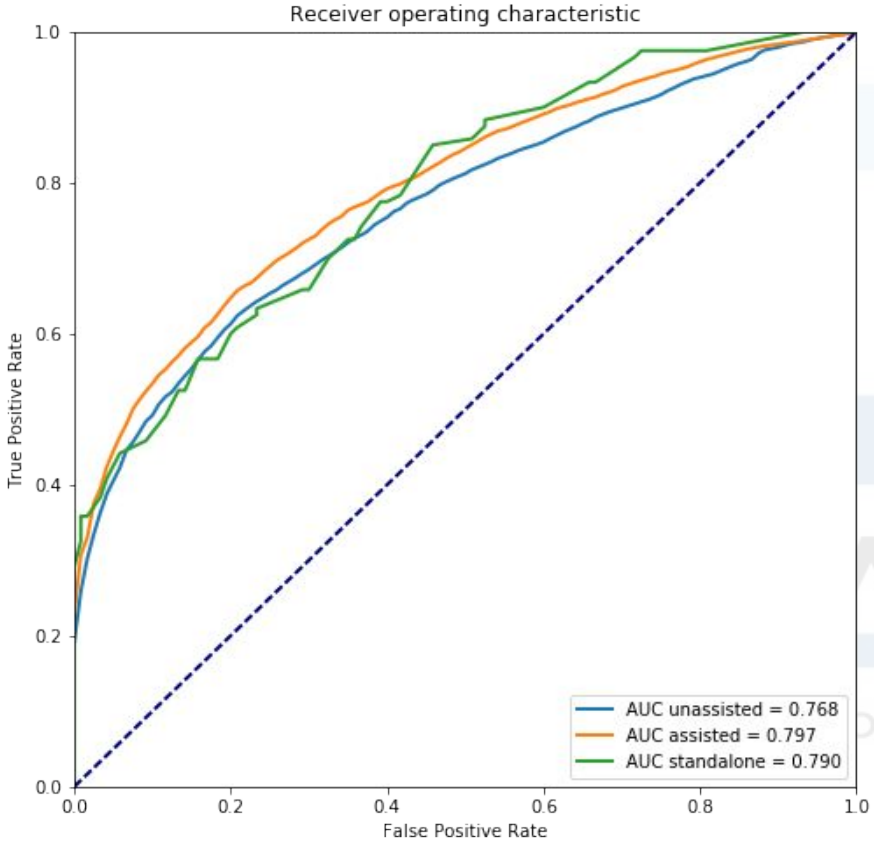




MammoScreen: virtual radiologist assistant



MammoScreen: clinical study shows human-level performance



- on a difficult dataset enriched in cancer
- 14 radiologists specializing (!) in mammography
- MammoScreen 1.0 = reliable peer for radiologist
- US FDA clearance obtained
- MammoScreen 1.2 further increased performance

AI needs (cloud) infrastructure: MammoScreen in Production

Thank you for your attention!

Q&A session