HEADLINER Journey of Intelligence



Matthias Pfister

Head of Development Team, Optical Data Science, **Helbling Technik**

The Novartis

Foundation

13-14 September INTELLIGENT HEALTH 2023 Basel, Switzerland





@IntHealthAI
#IntelligentHealthAI
#SaveLivesWithAI

HEADLINE PARTNER

U NOVARTIS

PLATINUM SPONSOR INNOVATION & TECHNOLOGY

CITY PARTNER







Journey of Intelligence

September 13, 2023 – Intelligence Health Basel Matthias Pfister

Helbling Technik Innovation, together we do it.

AI-Supported Retinal Health Monitoring

- Point-of-care
- Personalization



What problem do we address?

- Age-related macular degeneration (AMD)
- 170 million individuals have AMD worldwide
- Third leading cause of vision loss

State-of-the-Art Workflow



Today's Challenge: Determining the Best Timing for the Next Injection

What is our solution?

- Disease monitoring at home
- Low-cost device
- Monitoring enables tailored treatment



Development Strategy



AI vs. Rule-Based Algorithm

For image segmentation, pattern recognition \rightarrow AI If underlaying physical model is known \rightarrow rule-based algorithms



Thickness change of 25 µm detected with

Fluid occurrence indicator



Confusion matrix on test set



Evolution of AI Models



Parameters in notable artificial intelligence systems

Parameters are variables in an AI system whose values are adjusted during training to establish how input data gets

Source: Epoch (2023)

OurWorldInData.org/artificial-intelligence • CC BY

Note: Parameters are estimated based on published results in the AI literature and come with some uncertainty. The authors expect the estimates to be correct within a factor of 10.

Source: https://ourworldindata.org/, Creative Commons BY license

Our World in Data

Larger AI models require more resources

- Training
- Using

 \rightarrow Sustainability

What is the next big thing?

Neuromorphic Computing

- What is it?
- How mature is it?
- What is a potential application?



Von Neumann Bottleneck

Von Neumann data transfer bottleneck



instructions

Central processing unit

Von Neumann Bottleneck



Image: https://medium.com/@abruyns/memory-holds-the-keys-to-ai-adoption-5acd5e06508b

Elements for Neuromorphic Computing

Memristor = **Mem**ory & Resistor







Instantaneous calculations at minimal energy consumption

Elements for Neuromorphic Computing



Experimental Characterization & Simulations







Neuromorphic Chips





MYTHIC



SYNTIANT[®]



brainchip

New Possibilities for Implants

Example: Active Intra-Ocular Lens Implant





- Less frequent charging
- More accurate classification of near vs. far vision

Conclusion

The next big thing is currently being developed!

→ Implants→ Wearables



More information at booth C34