HARNESSING BIG DATA FOR PRECISION MEDICINE AND HEALTHCARE

Wolfgang Nejdl, Niloy Ganguly, Megha Khosla
L3S Research Center & Leibniz Universität Hannover
Organized by L3S & Leibniz AI Lab

**Intelligent, Reliable and Responsible Systems**

- Artificial Intelligence, Machine Learning, Vision, Semantics
  + Security, Data Protection, Distributed Systems
  + Law, Sociology, Ethics
- 4 European Marie Curie PhD Networks
- 6 ERC Grants in the last 10 years
- 20+ L3S members, mainly from Hannover and Braunschweig
- 180+ PhD and Postdoc researchers

**Innovation** with strong interdisciplinary collaborations

- Intelligent Production
- Intelligent Mobility
- Personalized Medicine
- Digital Education
- plus biodiversity and others

14 Mio. Euro annual budget (of which 2 Mio. Euro are base funding)
Organized by L3S & Leibniz AI Lab

1 of 3 International Future Labs for Artificial Intelligence in Germany
- financed with about 5 Mio. Euro (BMBF) 2020 – 2023

30 - 50 Researchers
- 8 + 4 professors from Australia, New Zealand, India, Singapore and California (Stanford)
- 15 Professors from Hannover (10 LUH, 5 MHH)
- 12 + 8 PhD and Postdoc researchers
- 8 European Professors (5 in 2020 and 2021)

https://leibniz-ai-lab.de/
Medical Use Cases (together with Medical School Hannover)

- Leukemia
- Mental Health
- Breast Cancer
Pediatric Leukaemia

• most common cancer among children
• most frequent cause of early age death from cancer
• Germany ~600 children diagnosed annually
• Hannover Human Genetics Dept is the Reference Lab in Germany / partner of European & International studies

Goal: Multidimensional integration of genomic, epigenomic & clinical data to personalize pediatric oncology

Image adapted of Stricker et al, Nat Rev 18, Jan 2017
Psychiatric Disorders

- Reverse phenotyping of psychosis with genetic information from around 50,000 patients diagnosed with schizophrenia

- Multi modal data (imaging, genomic, epigenomic) analysis for early diagnosis of neurodegenerative disorders

More on psychiatric disorders by Helge Frieling in the next session
Breast Cancer

• Most common cancer in women (1:10)
• >1 million new cases annually worldwide
• >70K cases alone in Germany
• >250 K deaths annually worldwide
• Data from "Network Breast Cancer"

Goal: Identify factors for therapeutic success in patients diagnosed with breast cancer.
## Schedule June 10

### Introduction to Future Lab

9:00 – 9:10

### Session: Computational Methods in Medicine

<table>
<thead>
<tr>
<th>Speaker</th>
<th>Time</th>
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<tbody>
<tr>
<td>Yang Li</td>
<td>9:15 – 9:45</td>
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<tr>
<td>Bodo Rosenhahn</td>
<td>9:50 – 10:30</td>
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<tr>
<td>Bidisha Samanta</td>
<td>10:35 – 11:10</td>
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<td>Manuel Gomez Rodriguez</td>
<td>11:15 – 12:05</td>
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### Session: Mental Health

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<th>Speaker</th>
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<tr>
<td>Helge Frieling</td>
<td>3:00 – 3:35</td>
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<td>Surya Ghosh</td>
<td>3:40 – 4:15</td>
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<td>Akane Sano</td>
<td>4:20 – 5:10</td>
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<td>Tim Althoff</td>
<td>5:15 – 6:05</td>
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## Schedule June 11

### Session: Medical Text and Data Mining

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<tr>
<th>Speaker</th>
<th>Time</th>
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<tbody>
<tr>
<td>Robert Hoehndorf</td>
<td>9:00 – 09:50</td>
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<tr>
<td>Stefan Schulz</td>
<td>09:55 – 10:45</td>
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<td>Animesh Mukherjee</td>
<td>10:50 – 11:20</td>
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<tr>
<td>Antje Wulff</td>
<td>11:25 – 12:00</td>
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### Session: Epidemiology

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<tr>
<td>Fernando Peruani</td>
<td>3:10 – 4:00</td>
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<tr>
<td>Gautam Menon</td>
<td>4:05 – 4:55</td>
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<tr>
<td>Madhav Marathe</td>
<td>5:00 – 5:55</td>
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We will be tweeting live from the event!
If you are tweeting from the event, please tag us @AILeibniz and use the Hashtags #BigDataInMedicine and #LeibnizAIworkshop.
Thank you!