GMDS & CEN-IBS 2020 – Workshop:
Workshop: Making Decisions in Biomedical Informatics

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Agenda

GMDS & CEN-IBS 2020 – Workshop: Making Decisions in Biomedical Informatics

10:00 - 10:10  Introduction (Tim Beißbarth, Universitätsmedizin Göttingen)
10:10 - 10:35  Summary of the talk with followed discussions: "The molecular Haemogram-challenges for biomedical IT" (Andreas Keller, Universität des Saarlandes)
10:35 - 11:00  Summary of the talk with followed discussions: "Analyzing brain MRI data with machine (deep) learning - promises and pitfalls" (Kerstin Ritter, Charité Berlin)
11:00 - 11:25  Summary of the talk with followed discussions: "Knowledge management support for molecular tumor boards" (Ulf Leser, Humboldt-Universität Berlin)
11:25 - 11:35  Summary (Ulrich Sax, Universitätsmedizin Göttingen)
11:35 - 12:00  General discussion (Ulrich Sax, Tim Beißbarth)
Summary

#31: how to bring this in the clinic? (Keller)

– single cell RNA sequencing of blood cells show high resolution, potential to alter current medical procedures
– BUT bears challenges for bioinformatics and medical informatics

QUESTION: which ones?
- longitudinal mapping
- make data more accessible
- more interpretable
- integrated data and method in hospital information systems (!)
Summary

*why translation in clinical routine so difficult? (Ritter)*

- ML: needs a lot of data – hospitals protect (s. MII?)
  ML: standardizes data–heterageneous (s. GECCO Plus, MII)

- well defined problems – multi-leveled problems
- depends on gold standard – diagnostic guidlines are changing (!!)

- perceived as black box — need acceptance (transparency, responsibility)
- (3) Black box criticism
- Clinicians, Patients need “Trust” (compare to Amazon, cars?)

- possible Solution: Explainability: use heat maps for visualizing significance
- reduce dimensionality
Shared Decision Making in Tumor Boards

Various therapies:
- surgery
- radiotherapy
- chemotherapy
- immunotherapy
- Targeted Therapy

Molecular tumor board:

Lung cancer:
- ALK, ROS1 Translocation
- EGFR Mutations

Breast cancer:
- HER2 amplification

AML
- PML-RARA or MLL translocation

Decision about therapy in interdisciplinary team.

targeted drugs to individual genetically modified molecular targets.

ALL, CML:
- ABL1-BCR Translocation
- ABL1 Mutations

Gastrointestinal tumors:
- KIT Mutations

Ovarian carcinoma:
Summary

*how do we filter for clinical relevance - does it help at all? (Leser)

- pubmed ranks by recency
- everybody can build nice interfaces...but do they help?
- VIST with clinical relevance ranking
- Integrated Variant Information System (I-VIS)
  - how to include external knowledge
  - difficult: semantic data integration - Normalization
  - mapping to standard ID-room (which one?)
Impact of NGS-based Precision Oncology

- **Does it help at all?**

- Several ongoing / past trials
  - NCT Master, SHIVA, NCI Match, I-Spy, MOSCATO ...

- **Results**
  - Patients with *actionable variant*: 10-40%
  - Patients with *targeted therapy*: 5-15%
  - No prolonged overall survival

- **Problem:** Difficult cases with *rare molecular make-up*
  - Heterogeneous patient groups outside clinical guidelines
  - Patients often die rapidly – effect of drugs remains unknown
Summary: hot topics

Accessibility of relevant data
  • identified vs. de-identified
  • patient consent - follow up MII / synthetic data / data donation

Integratibility of the data
  • formats, okstandards, terminologies
  • information models ([GECCO Plus example on COVID-19](#))
  • visualization and UI

Interpretability (black box?)
  • visualization (heat maps etc.
  • role of the manufacturer (will come: "one stop shop")

Tangibility in hospital-infrastructure
  • functionality
  • MDR, liability
  • usability
  • acceptance
    from prototype to sustainable infrastructure!!
### 1. What is your main area of work? (Mehrfachauswahl)

<table>
<thead>
<tr>
<th>Area</th>
<th>Count (of total)</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Medical Informatics</td>
<td>2 (of 11)</td>
<td>18%</td>
</tr>
<tr>
<td>Bioinformatics</td>
<td>7 (of 11)</td>
<td>64%</td>
</tr>
<tr>
<td>Biometry</td>
<td>1 (of 11)</td>
<td>9%</td>
</tr>
<tr>
<td>Epidemiology</td>
<td>1 (of 11)</td>
<td>9%</td>
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<tr>
<td>Medicine</td>
<td>0 (of 11)</td>
<td>0%</td>
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<tr>
<td>Systems Medicine</td>
<td>0 (of 11)</td>
<td>0%</td>
</tr>
<tr>
<td>Other</td>
<td>1 (of 11)</td>
<td>9%</td>
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</table>
1. Which areas did you learn something about in this workshop? (Mehrfachauswahl)

<table>
<thead>
<tr>
<th>Area</th>
<th>Count/Total</th>
<th>Percentage</th>
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<tbody>
<tr>
<td>Medical Informatics</td>
<td>(8/13) 62%</td>
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<tr>
<td>Bioinformatics</td>
<td>(11/13) 85%</td>
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<tr>
<td>Biometry</td>
<td>(0/13) 0%</td>
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<tr>
<td>Epidemiology</td>
<td>(0/13) 0%</td>
<td></td>
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<tr>
<td>Medicine</td>
<td>(2/13) 15%</td>
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<tr>
<td>Systems Medicine</td>
<td>(3/13) 23%</td>
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<tr>
<td>Other</td>
<td>(2/13) 15%</td>
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1. Do you think there is a difference between Medical Informatics and Medical Bioinformatics?

<table>
<thead>
<tr>
<th>Option</th>
<th>Count</th>
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<tbody>
<tr>
<td>No</td>
<td>0</td>
<td>0%</td>
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<tr>
<td>Mainly semantic</td>
<td>1</td>
<td>10%</td>
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<tr>
<td>There is a lot of overlap</td>
<td>7</td>
<td>70%</td>
</tr>
<tr>
<td>Some overlap but big difference</td>
<td>2</td>
<td>20%</td>
</tr>
<tr>
<td>Completely disjunct fields</td>
<td>0</td>
<td>0%</td>
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1. Will Omics play a role in Clinical Decision making?

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<tbody>
<tr>
<td>Yes</td>
<td>(8) 67%</td>
</tr>
<tr>
<td>No</td>
<td>(0) 0%</td>
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<tr>
<td>Distant future</td>
<td>(4) 33%</td>
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1. Will AI play a role in Clinical decision making?

- Yes: 7 (58%)
- No: 0 (0%)
- Distant future: 5 (42%)
Outlook

• What would be like to chew on the next months

• Next Steps

• WG meetings

• reports, papers
Kontakt

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