Knowledge Building Environments

Creating Practical Knowledge for Personalized Medicine

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Overview

- Data Integration
- Statistical Correlation
- Knowledge Resources
- Knowledge Building
Goals

• What is unique and relevant about this disease, target, cohort, patient, treatment?

• What are the adequately-explanatory, sensitive and specific patterns for decision-making?
I. Data Integration

- OMICs (i.e. Genomics, Proteomics)
- Demographic
- Clinical
I. Integration Challenges

• Access
• Integration/ Federation
• Validation
• Precision
• Reproducibility
II. Statistical Correlation

- Modeling, normalization, clustering, validation
  - R, SAS / JMP, KNIME, Pipeline Pilot
II. Statistical Challenges

- Diversity of analytical methods
- False discoveries
- Correlation / causation
- Context
- Normalization
III. Knowledge Resources

• Public and commercial resources
  – PubMed, LOD, Integrity, GeneGo, Ingenuity
III. Resource Challenges

• Relevance
• Provenance
• Harmonization
• Integration
• Causality
Knowledge Building

• “Connecting the dots”
• Hypothesis generation – discovering and explaining connections
• Testing, refining, and applying useful patterns
EXAMPLE USE CASES
Genomic, proteomic, and imaging endpoints have been analyzed across different animal species for biomarker discovery of species-independent disease markers applicable to human diseases to minimize animal experiments.
• Assess the effectiveness of combination treatments for prostate cancer based on genomic / proteomic markers
Toxicity Classification

- Develop multi-modal biomarkers to classify types of toxicity
Applied Knowledge for Personalized Medicine

- Relevant Data
- Statistical Correlation
- Knowledge Resources

- Tools for integration, visualization and testing to understand and apply personalized medicine

- Health is a social network; connecting communities of experts, patient data, and reference resources is key

- The personalized medicine puzzle is coming together and it is happening now!
THANK YOU!

QUESTIONS

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