

# Bayesian Clustering of Multi-Omics

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Intermediate Presentation Trends in Bioinformatics

# Overview

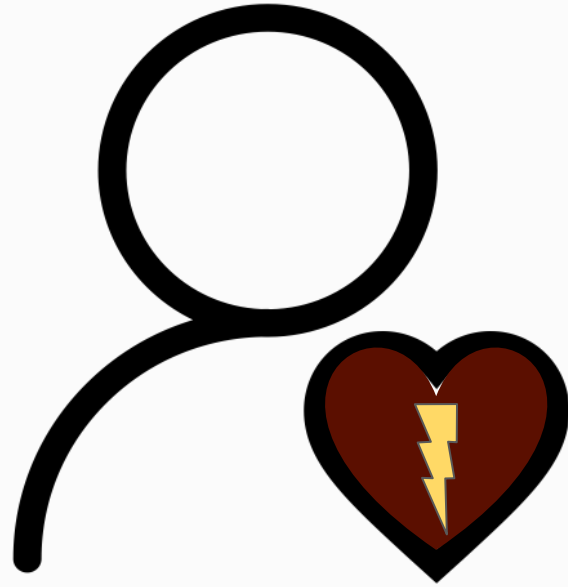
Standardized Care

Precision Medicine

iClusterBayes

Task

Progress



Sam

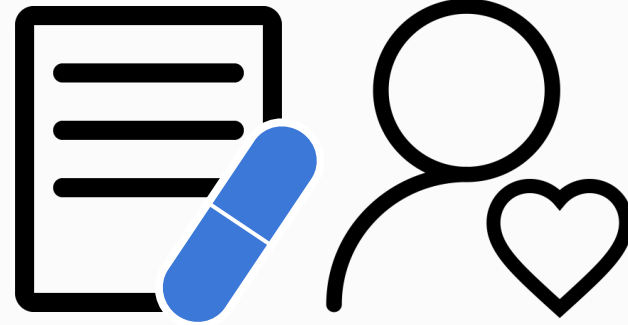
# Standardized Care



Standard practice

Experience

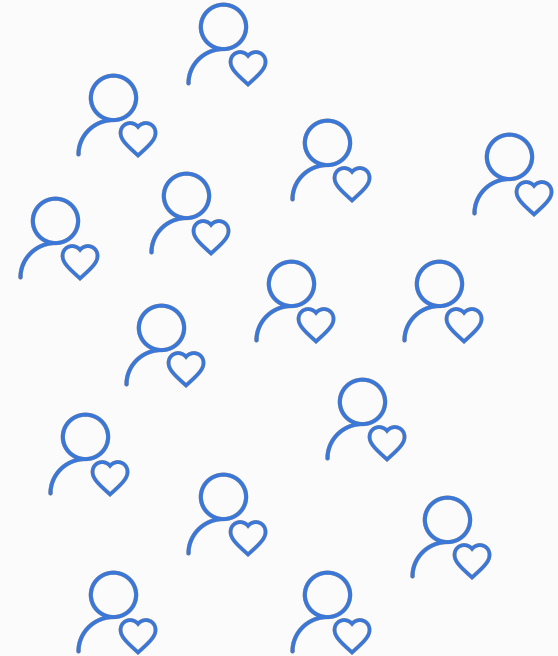
Generalized  
recommendation



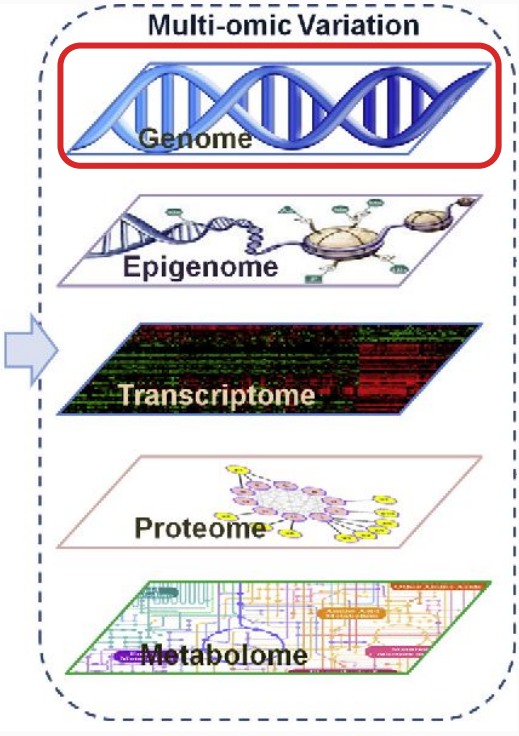
# Standardized Care



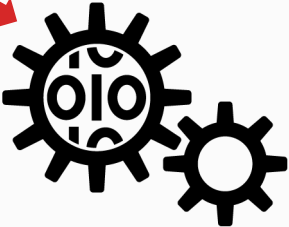
Generalized  
recommendation



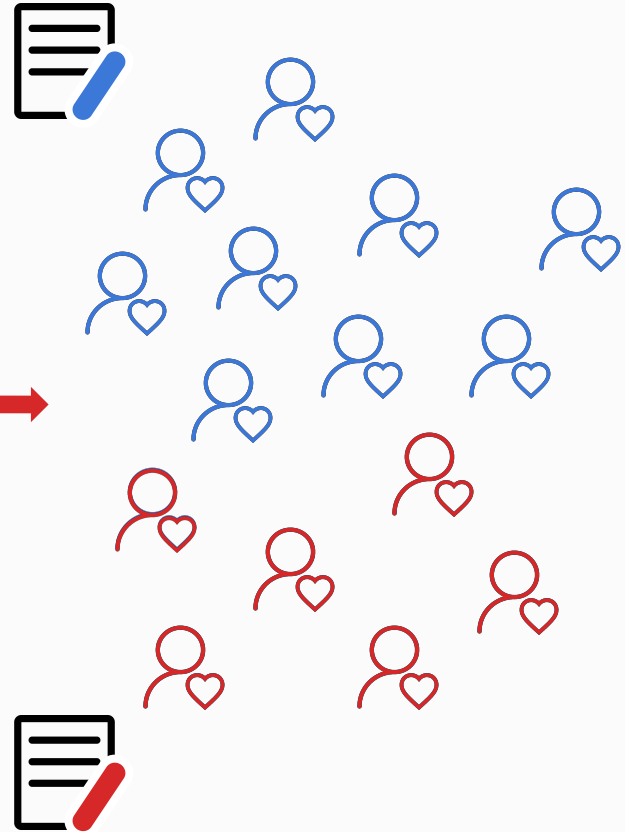
# Precision Medicine



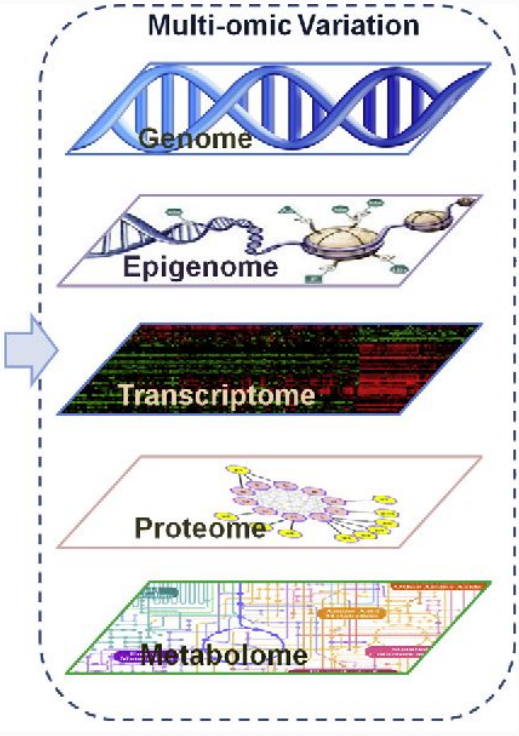
High-throughput multi-omic information



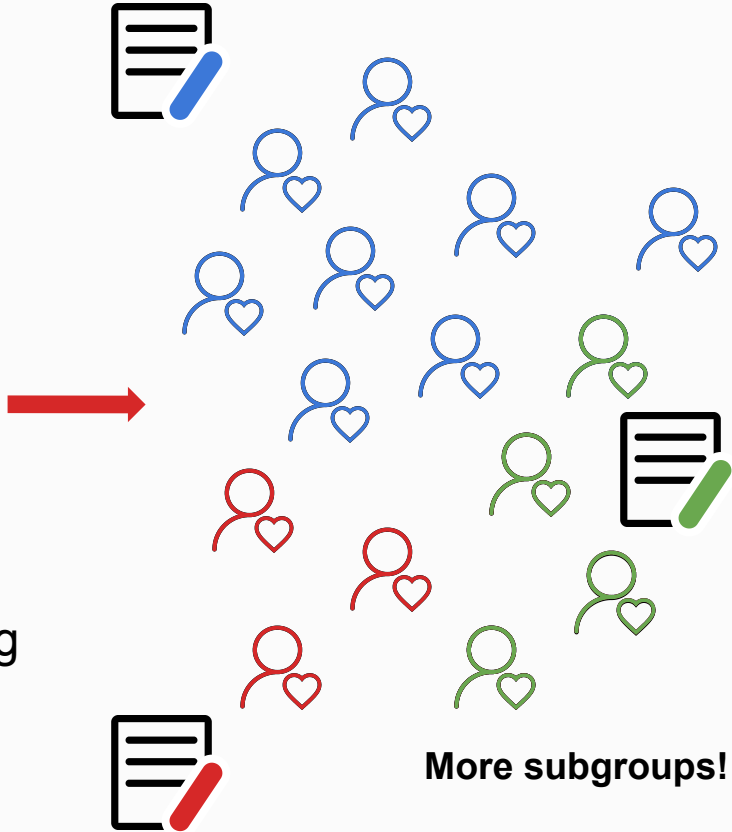
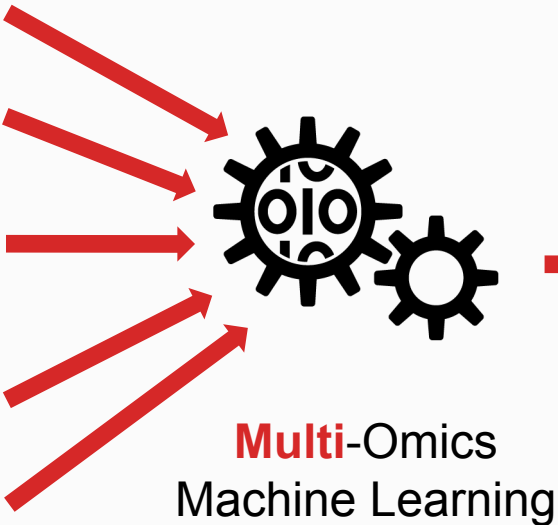
**Single-Omics**  
Machine Learning



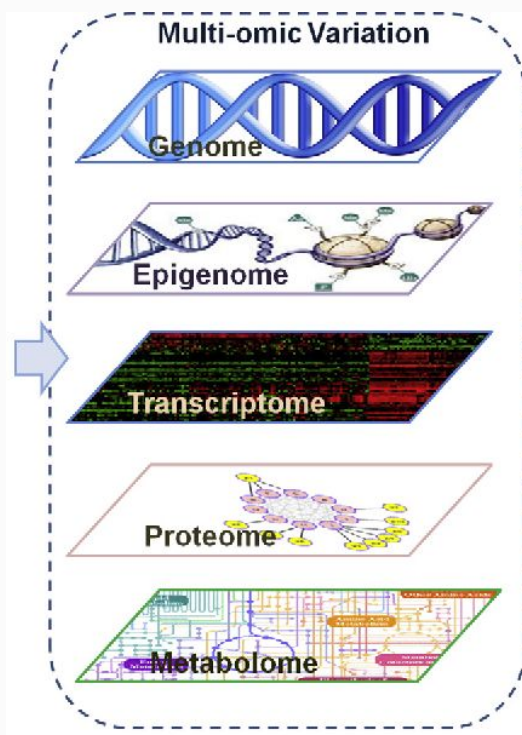
# Precision Medicine



High-throughput multi-omic information



# Problem: Heterogeneous data



- Continuous
  - Gene expression, DNA methylation
- Discrete
  - Binary
    - Somatic mutations
  - Counts
    - RNA-seq gene expressions
  - Categorical
    - Copy number states (gain, normal, loss)

Hierarchical or k-means clustering ❌

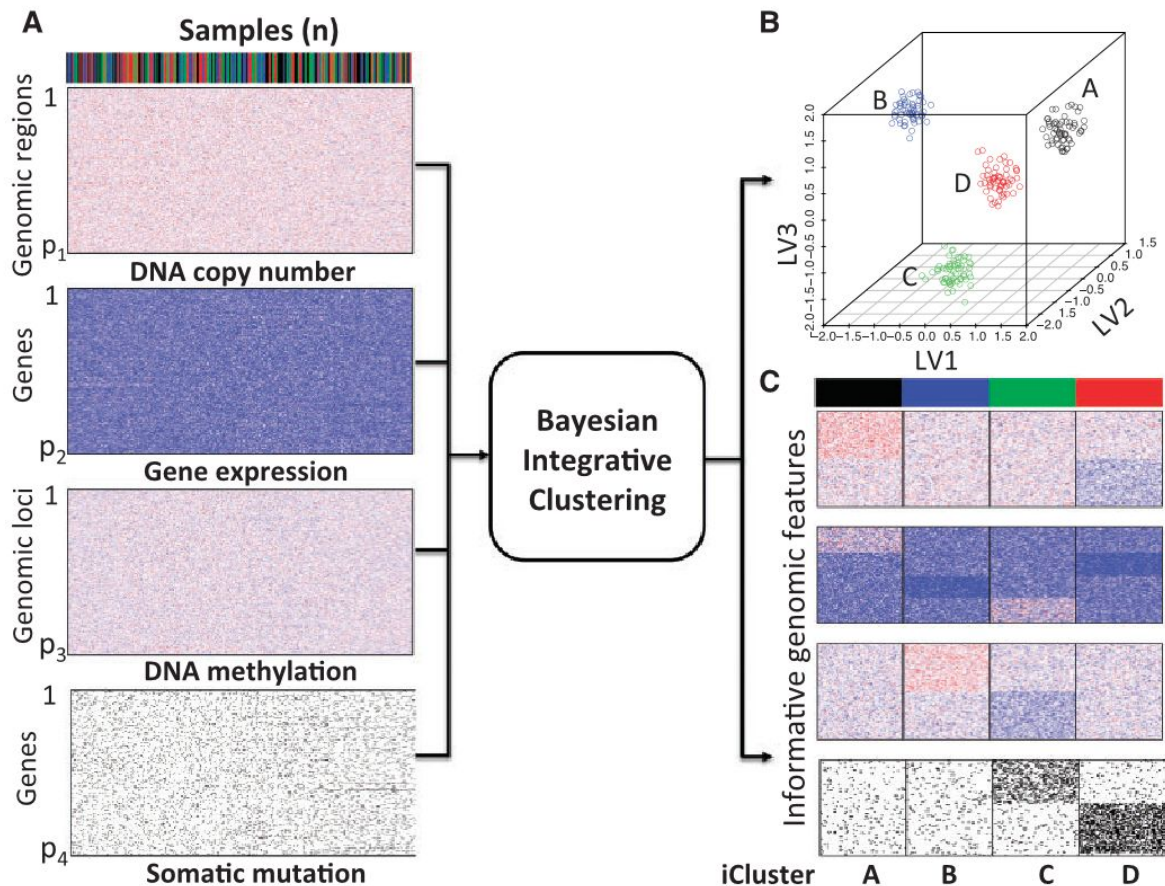


# iClusterBayes

- joint integrative clustering framework
- Bayesian latent variable regression models
- relevant omics features are identified through Bayesian variable selection

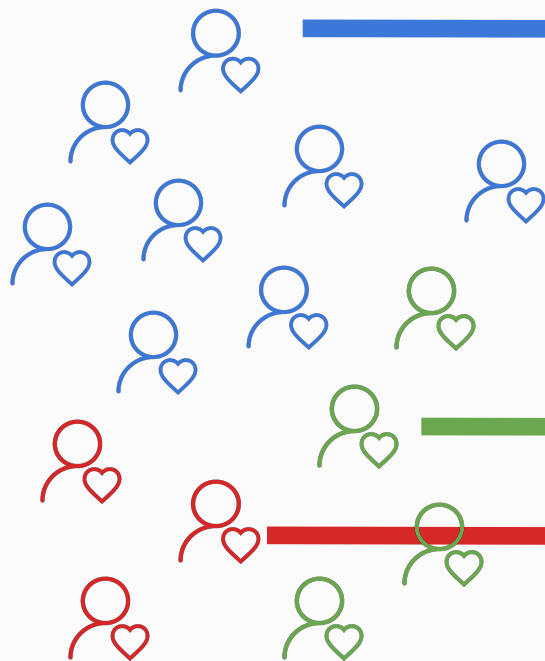
## Bayesian Clustering Model

- Each sample has a probability of belonging to a cluster
- Iteratively improve this probability



# Task

Find subgroups of heart failure patients



Link to clinical features

Dyspnea

Jugular Venous Distention (JVD)

Pitting edema

Ascites

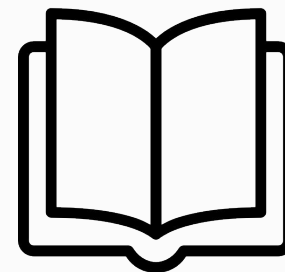
Nutmeg Liver

Obesity

Validate



Expert

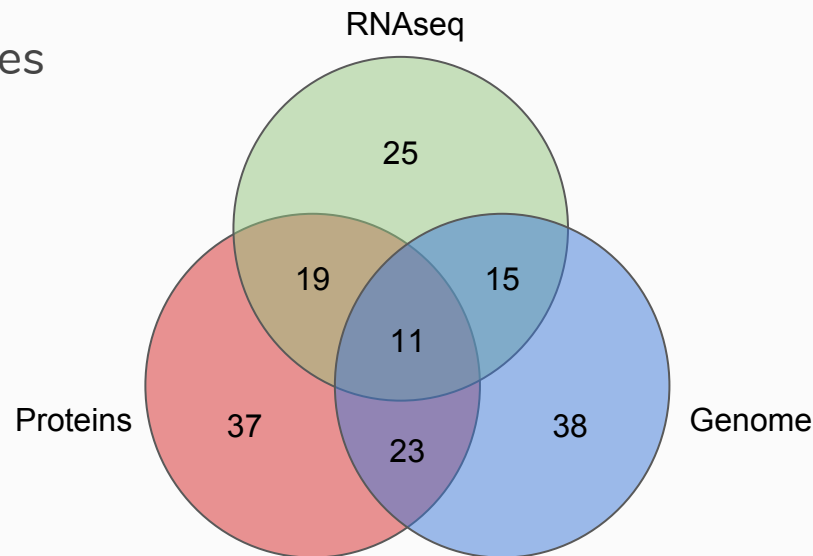


Literature

# Progress

iClusterBayes provided good examples, but focuses on genomics & cancer

Data preparation of the different data types



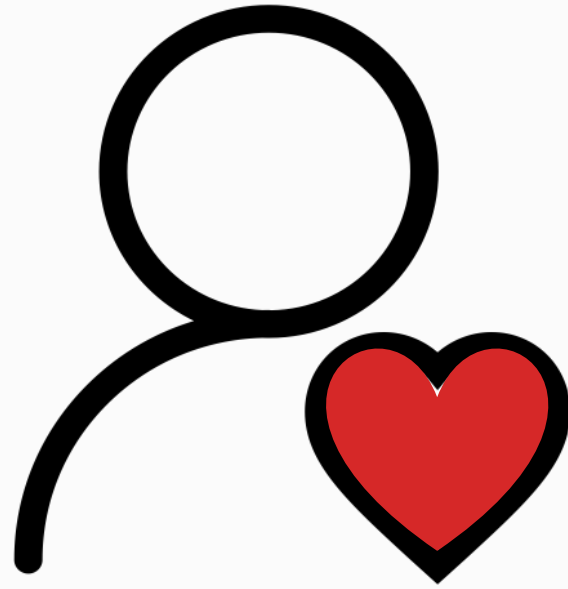
## Additional task

Compare cluster using different subsets of the data



Precision  
Cardiology





Sam





# Sources of images used

- [https://www.123rf.com/photo\\_76258396\\_stock-vector-female-doctor-icon-physician-person-with-stethoscope-and-cross-profile-avatar-in-glyph-pictogram-vec.html](https://www.123rf.com/photo_76258396_stock-vector-female-doctor-icon-physician-person-with-stethoscope-and-cross-profile-avatar-in-glyph-pictogram-vec.html)
- [https://pngtree.com/free-icon/patient\\_1257502](https://pngtree.com/free-icon/patient_1257502)
- <http://simpleicon.com/wp-content/uploads/note-4.png>
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- [https://www.simula.no/sites/default/files/styles/original\\_dimension\\_image/public/articles/images/01\\_icon\\_software\\_engineering\\_rgb\\_black.png?itok=HNDDcPzS](https://www.simula.no/sites/default/files/styles/original_dimension_image/public/articles/images/01_icon_software_engineering_rgb_black.png?itok=HNDDcPzS)
- <https://www.kisspng.com/png-computer-icons-literature-book-author-literary-1442552/download-png.html>
- Matrix The Film
- A fully Bayesian latent variable model for integrative clustering analysis of multi-type omics data. - Mo Q. et al