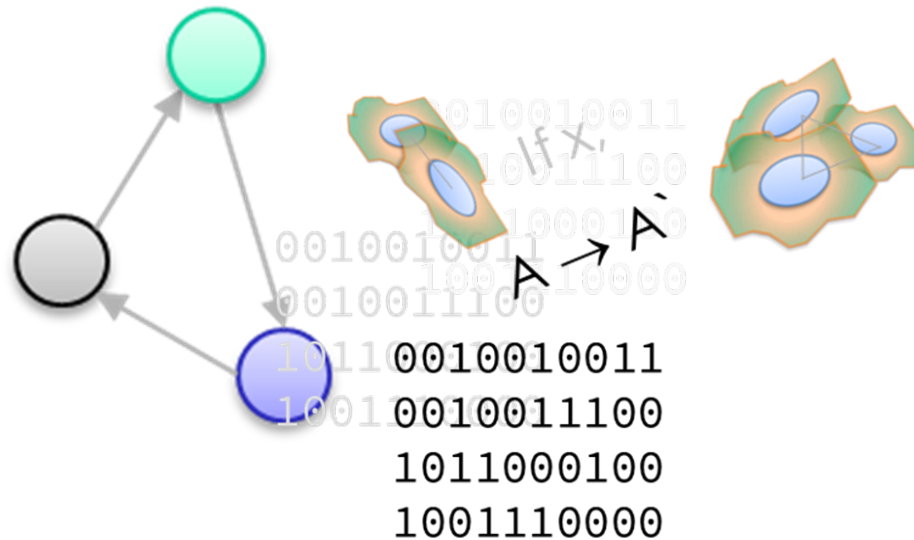


Computational Bioengineering

BME 4803 | BME 6313

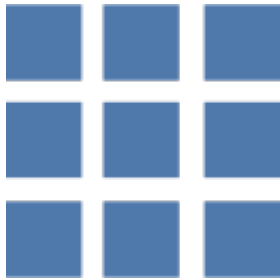


Heatmaps Introduction

Slide Credits:

Dr. Chenyue Wendy Hu

Concept



Map



Continuous: expression levels
Categorical: sex, mutation, condition

Matrix Values

Colors

Application

Benefits

- Easy to interpret visually (color vs. text)
- Compact presentation of lots of information

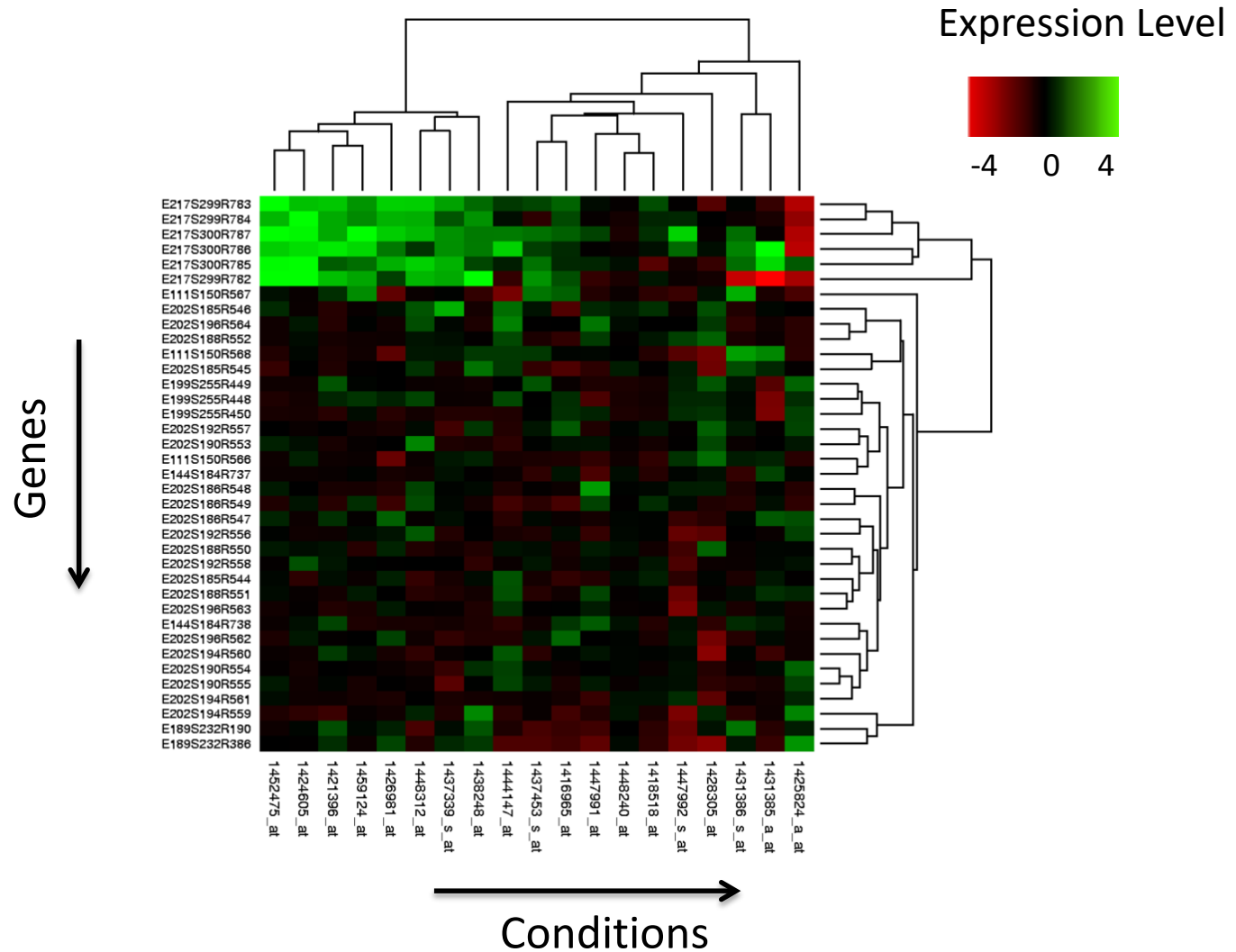


Application Scenarios

- You have data of relatively large size
 - matrix or data table
- You want to see or show differences between data elements
 - accompanied by clustering

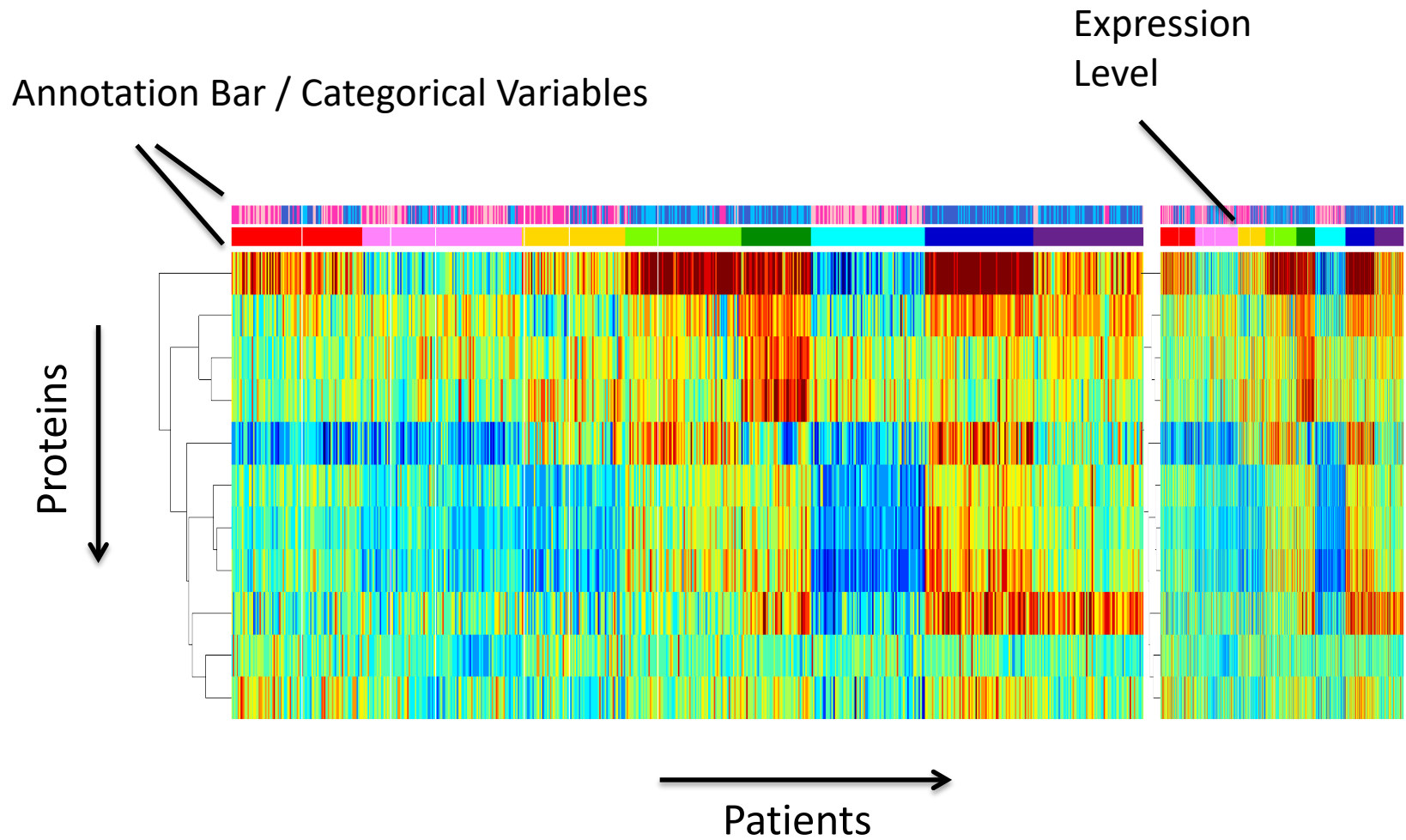
Examples

Microarray Data



Examples

Protein Array Data

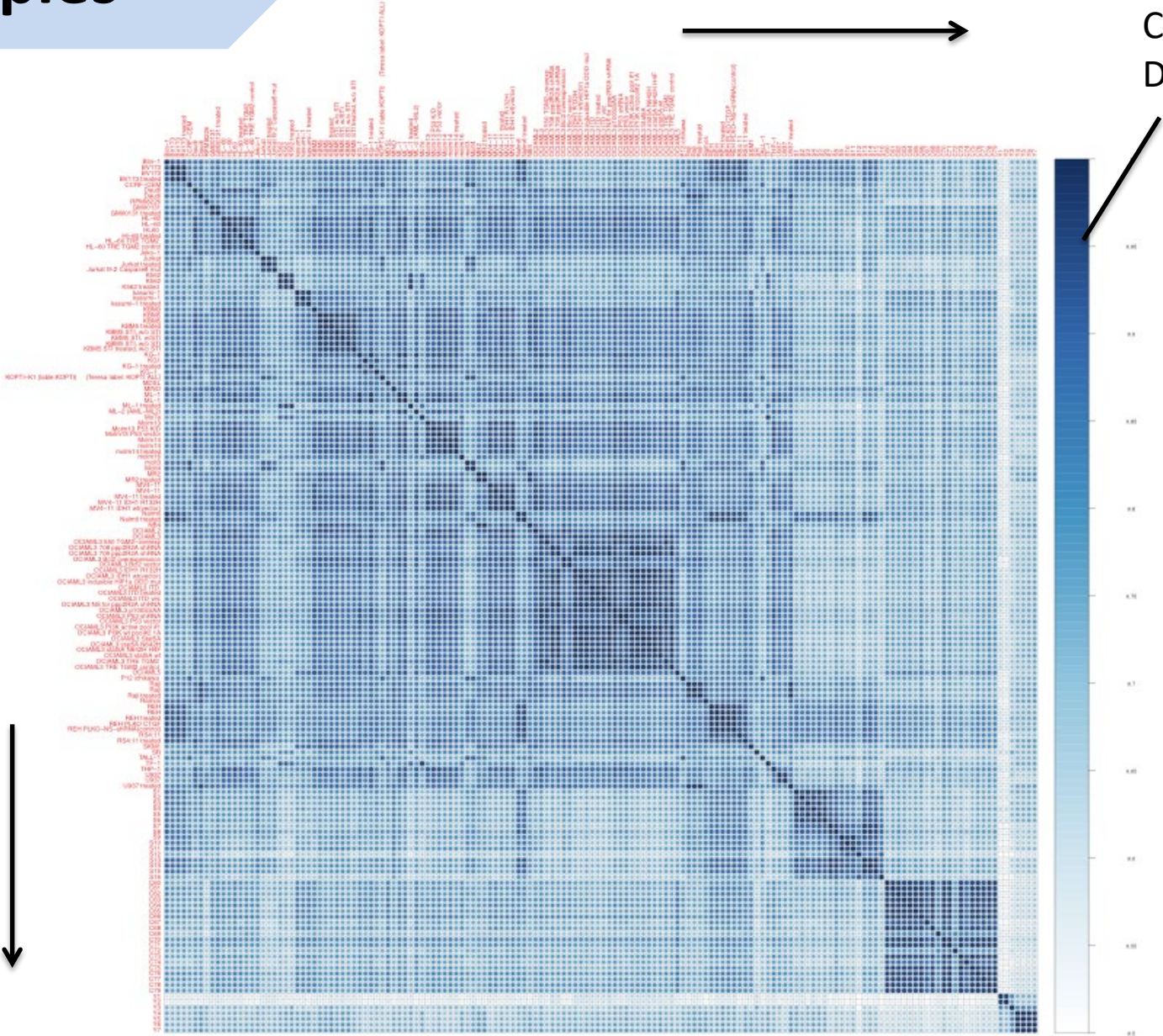


Examples

Cell Lines

Cell Lines

Correlation Degree



Best Practices

Color Choices



Traditional for microarray data



Color Blindness Consideration

vischeck.com



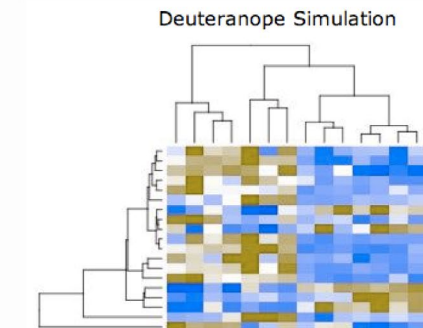
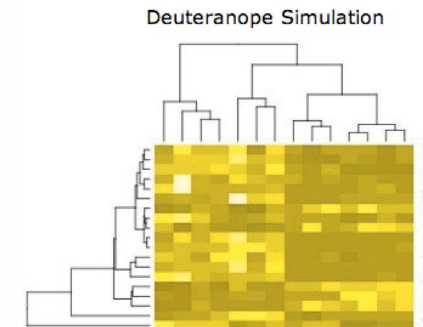
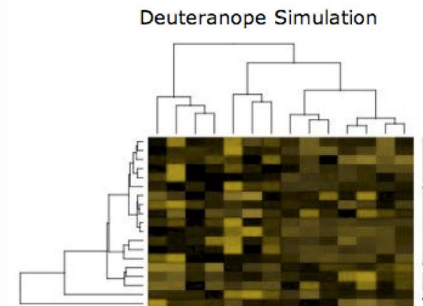
More shades and more perceivable detail;
Discouraged in some cases



Safe choice for print
But lack shades

Color Selection Criteria

- ✓ Display best contrast for data
- ✓ Color-blindness friendly



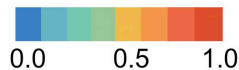
Circular Heatmap

Rows, Objects, Samples

e.g. employees, patients, students, companies, divisions, departments, products, time points, genes

Color Mapping for Continuous Variables

Numerical values from low to high are represented using a spectrum of colors. For example,

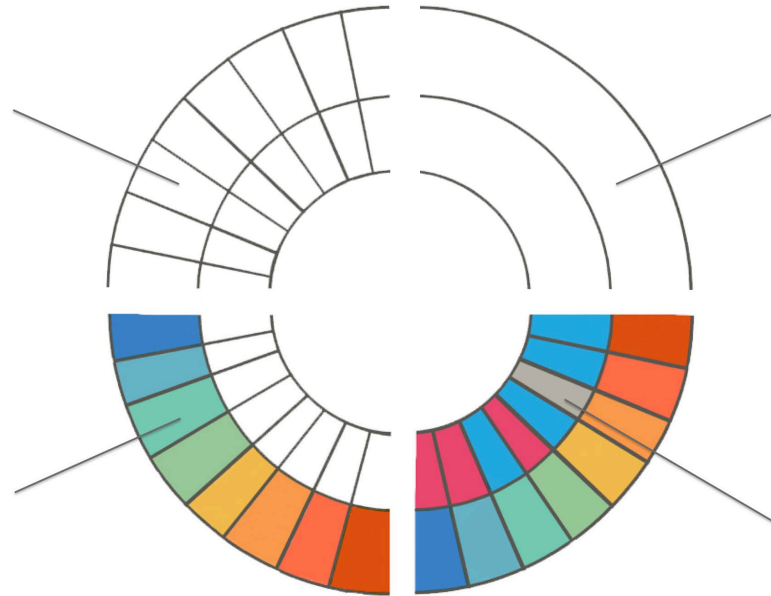


Columns, Variables, Features

e.g. gender, age, disease type, test score, price, performance, material, revenue, downloads

Color Mapping for Categorical Variables

Data categories are represented using distinct colors. For example,



Pro

- End-to-end comparison
- Center space ideal for drawing links (e.g. protein interactions)

Con

- Unbalanced focus on inner vs. outer rings

Biowheel (Academic Version)

- Free to use
- No programming required
- Interactive (for data exploration)
- Clustering

Data Preparation

- Data matrix in CSV or Excel format
- Apply appropriate normalization
(e.g. z-score, min-max)

Tutorial

Open your browser

<http://academic.dibsvis.com>

Create a user account

Example Data Download Link

<https://www.dropbox.com/s/2xl43e6844f688y/workshop.xlsx?dl=0>