Visualization of RNA-Seq Data
Data Visualizations

- Visualizations are useful for:
  - Illustrating relationships between variables
  - Identifying patterns/issues in the data
  - Summarizing results
Preprocessing of data

• Not Raw Read Counts

• Many visualizations (all of the ones in the following slides) work best on normalized, log transformed gene expression data.
MA Plots

- For visualizing differences in measurements (in this case, gene expression) between two groups.
- M - log fold change (differences between two groups)
- A - mean gene expression (average value across samples)
Volcano Plots

- Plots fold change vs significance value for all genes.
- Helps quickly see how many significantly differentially expressed genes are present.
Heatmaps

- Heat Maps represent gene expression by colors.
- For visualizing how gene expression changes in different samples.
- Columns are genes
- Rows are Samples
Heatmaps/Clustering

- Dendograms can be added to heat maps
- Samples can be clustered by gene expression
- Genes can be clustered by gene expression
- Time consuming for large number of genes
Principal Component Analysis

- Each principal component is one dimension in the data.
- Illustrates how the data groups based on the dimensions that represent the highest variability.
Principal Component Analysis

- What are the Principal components of this data?
- Directions where there is most variance.
- When data is projected onto a straight line, the data is most spread out.

https://georgemmdallas.wordpress.com/
Principal Component Analysis

- Each principal component is one dimension in the data.
- Illustrates how the data groups based on the dimensions that represent the highest variability.

Contributed by Nick Dawes
Looking at Some Real Data

- **Mysterious results for an experiment with 6 samples across:**
  - 2 different time points, 2 different conditions: control vs treated. 3 replicates each.

![DESeq2](image1.png)  
![DESeq2](image2.png)
Looking at Some Real Data

- Can these plots inform us about what might be going on?