

# Homework - Day 7

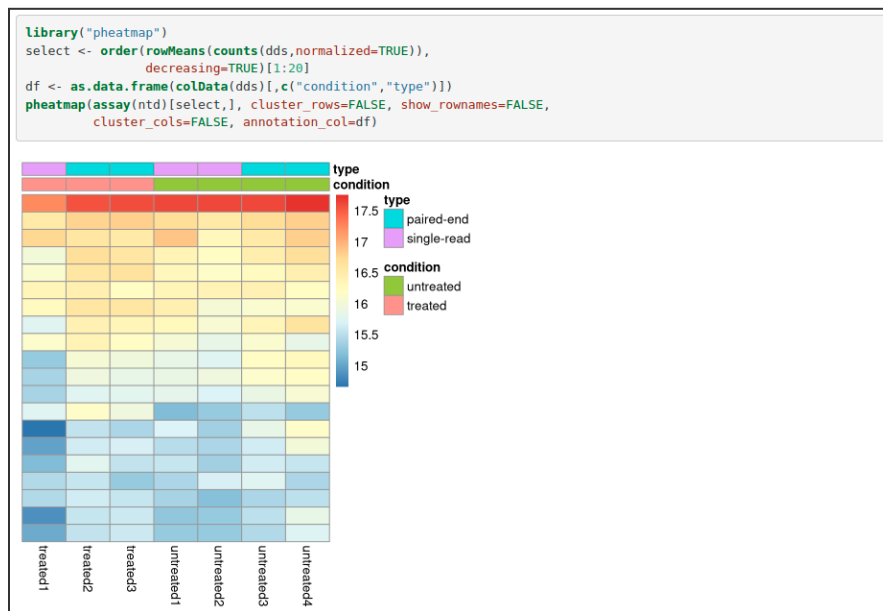
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1) Further explore DESeq2 results with a heatmap.

This DESeq2 document is regularly updated by the software authors:

<https://bioconductor.org/packages/release/bioc/vignettes/DESeq2/inst/doc/DESeq2.html>

It describes step-by-step how to use many DESeq2 functions. Among them, it describes how to further transform your data for clearer data visualization using the [regularized log transformation](#), among other approaches. Try transforming your data using one of these. You can then use the transformed data to make a [heatmap](#) displaying the top 20 genes with the highest normalized read counts.



2) Practice running DESeq2 on other datasets.

What happens to human cells when treated with either caffeine, nicotine, or ethanol? It is your homework to figure it out. These datasets were obtained from:

*Findley et al. Functional dynamic genetic effects on gene regulation are specific to particular cell types and environmental conditions. eLife. 2021. <https://doi.org/10.7554/eLife.67077>*

We have already processed the raw FASTQ files and made gene counts tables (Check in the appropriate Day 7 homework folder for these files). Make a new condition table for these files. Use DESeq2 to find differentially expressed genes. As you are doing your analysis with DESeq2, answer the following questions:

- What are the comparisons that you can do across the datasets?
- What role do you think the water treatment played in the experimental set-up?
- How many genes are differentially expressed between water and caffeine?
- How many genes are differentially expressed between water and nicotine?
- How many genes are differentially expressed between water and ethanol?
- How many genes are there whose expression changed across all three treatments?
- How many genes were expressed uniquely for each treatment?
- EXTRA: Can you find (screenshot) the most differentially expressed gene from each condition in IGV using depth-normalized TDFs?

Human ID	Treatment	Replicate
GM18855 Female Yoruba Nigeria	Water	1
	Water	2
	Caffeine	1
	Caffeine	2
	Nicotine	1
	Nicotine	2
	Ethanol	1
	Ethanol	2