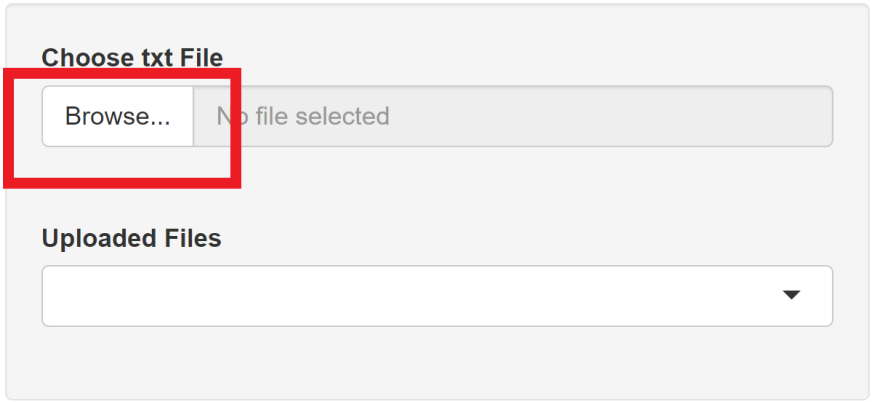
# Power Curve

## User Guideline

Welcome to our online power curve visualization tool! (http://powercurve.liuzlab.org/) It takes standard differential expression analysis results as input and will help you visualize the relationship between power and effect size in differentially expressed genes (DEGs).

### Step1: Upload your DESeq results:




Click the "Browse" button at the top left corner of the screen and select your DESeq result files. You can choose to select one or multiple files at a time. **The files should be in text format with field separator '\t' (tab delimited)**. The files should contain at least three columns named as **'Gene_ID'**, **'log2FoldChange'** and **'padj'**, which is case sensitive. These values can be accessed by a standard DESeq analysis. File size limit is 30MB each.

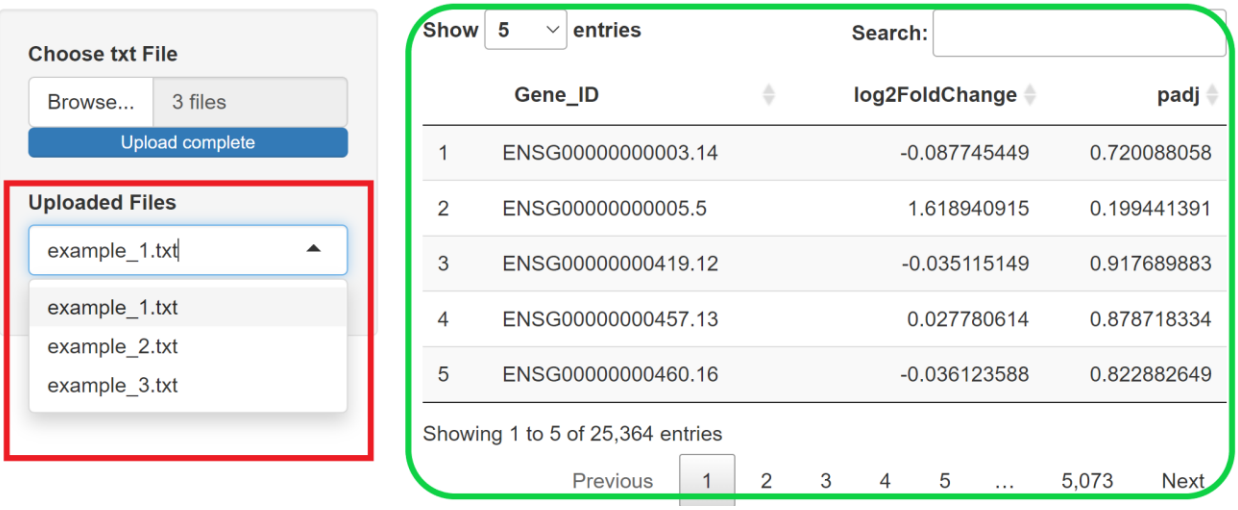
example_1.txt - Notepad

File Edit Format View Help

| Gene_ID | log2FoldChange | padj |
|---|---|---|
| ENSG00000000003.14 | -0.087745449 | 0.720088058 |
| ENSG00000000005.5 | 1.618940915 | 0.199441391 |
| ENSG00000000419.12 | -0.035115149 | 0.917689883 |
| ENSG00000000457.13 | 0.027780614 | 0.878718334 |
| ENSG00000000460.16 | -0.036123588 | 0.822882649 |

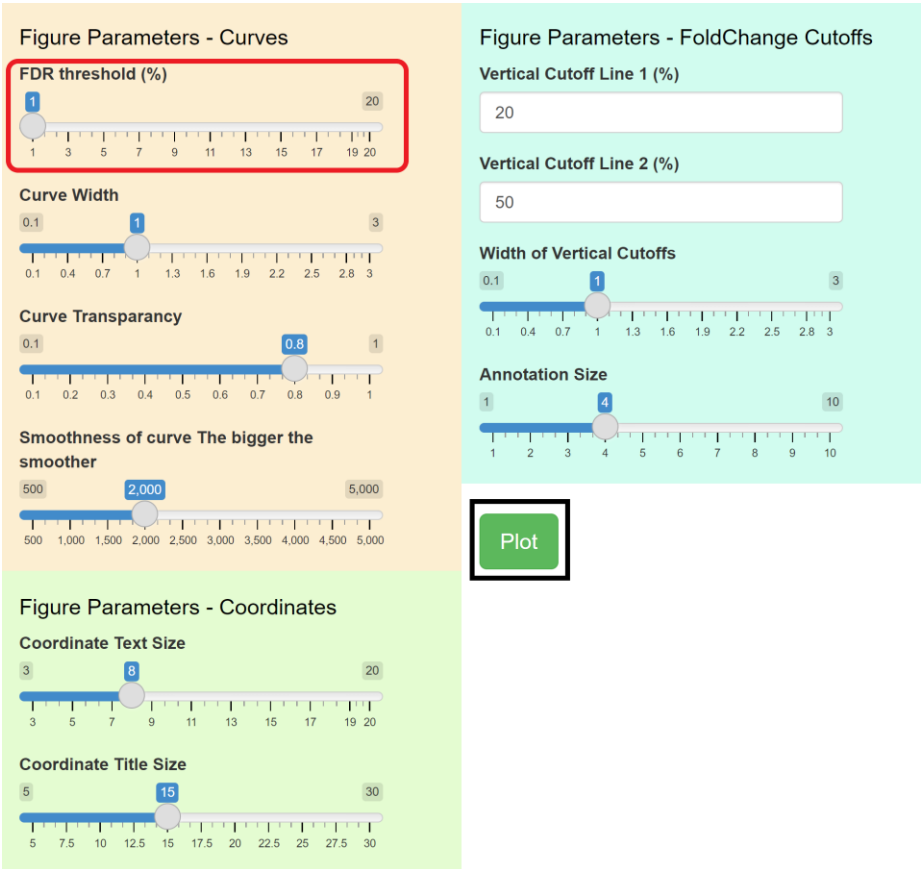
Your input data needs to be organized in this way

After the files are successfully uploaded, you will be able to see all of your uploaded files in the dropdown (shown in the red square). If you choose one file, the detail information of that file will be demonstrated on the right side (shown in the green square).




## Step2: Plot the curves

Select your FDR cutoff (ranging from 0.01 to 0.2) of the DEGs. Then click **Plot**!



The two plots are interactive figures, so when you move your mouse to the figure, there will be a control panel on the upper-left corner, which allows you to zoom-in, zoom-out, drag the figure center, check the data on the figure and download the figure.

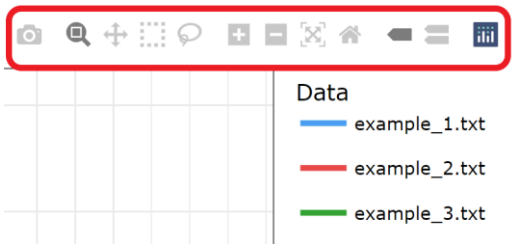
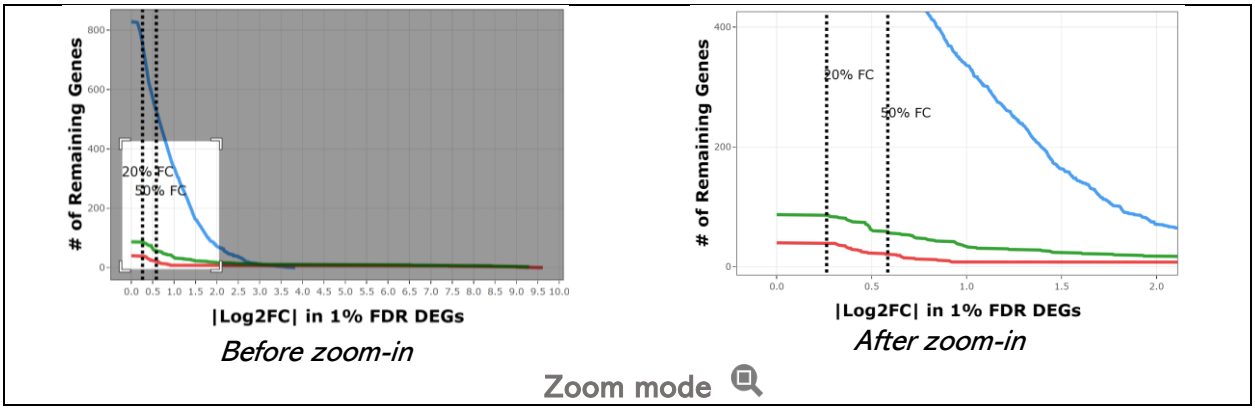



Figure Control Panel

Here are the detail instructions about how these buttons work.

This camera icon allows to download the current figure. It will save what you see to your local computer. So, if you zoom-in the plot, it will save a zoom-in version plot for you.

These two icons provide two modes for you to interact with the plot. The **zoom mode** and the **pan mode** . Under the **zoom mode** , you will be able to drag and create a square area to zoom-in. **Double click** the plot can reset the axes. Under the **pan mode** , please hold your mouse on the plot and drag the plot to move your view in the plot.



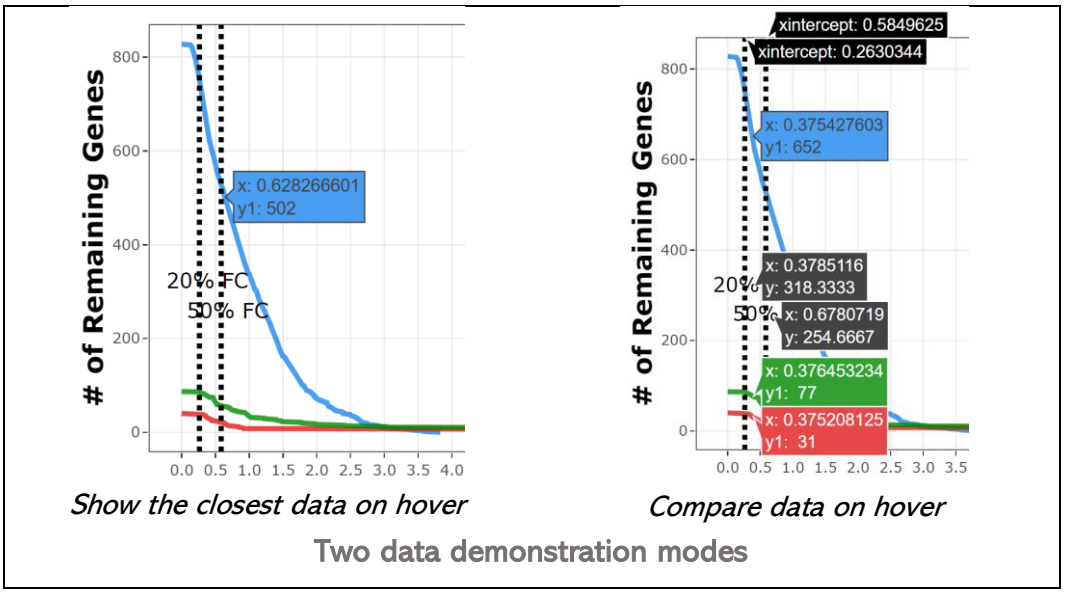

The box select button and the lasso select button provide you two ways to select items in the plot.

The zoom-in and zoom-out button will rescale your plot by the center of the plot. So, you can click these two buttons to make the plot in your preferrable scale and then choose the **pan mode** to move to your desire position.

Besides double click the plot, you can also use auto-scale button or reset axes button to reset the axes.

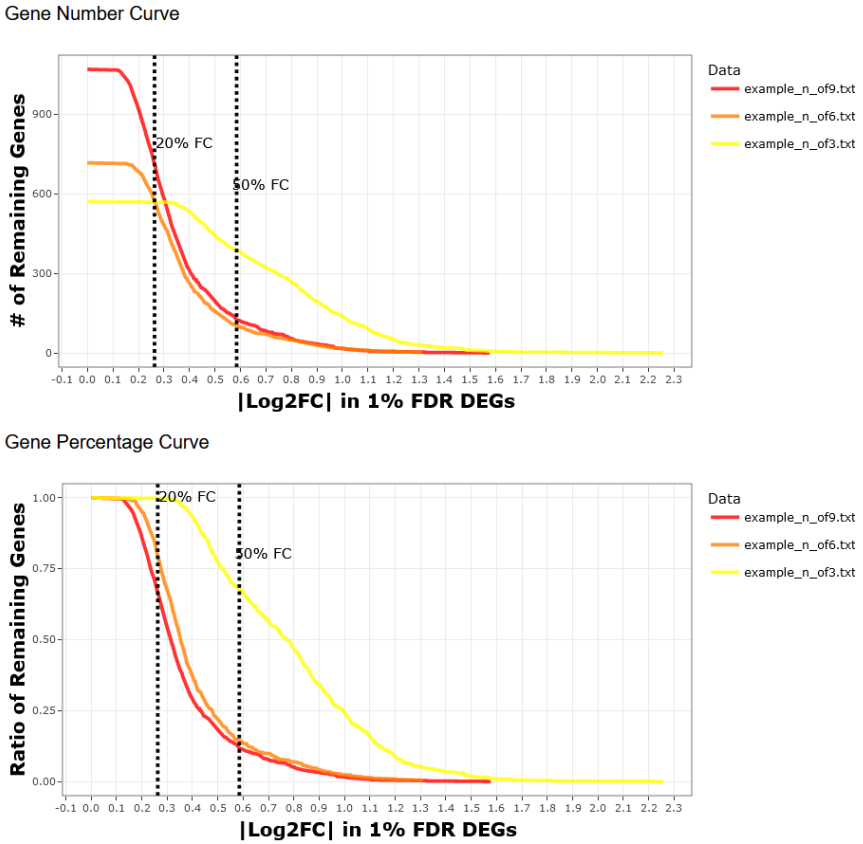
There are two data demonstration modes. One is to show the closest data on hover and the other is to compare data on hover . When you choose the second mode, it will show

you all the y values corresponding to the same x value when you move your mouse in the plot.

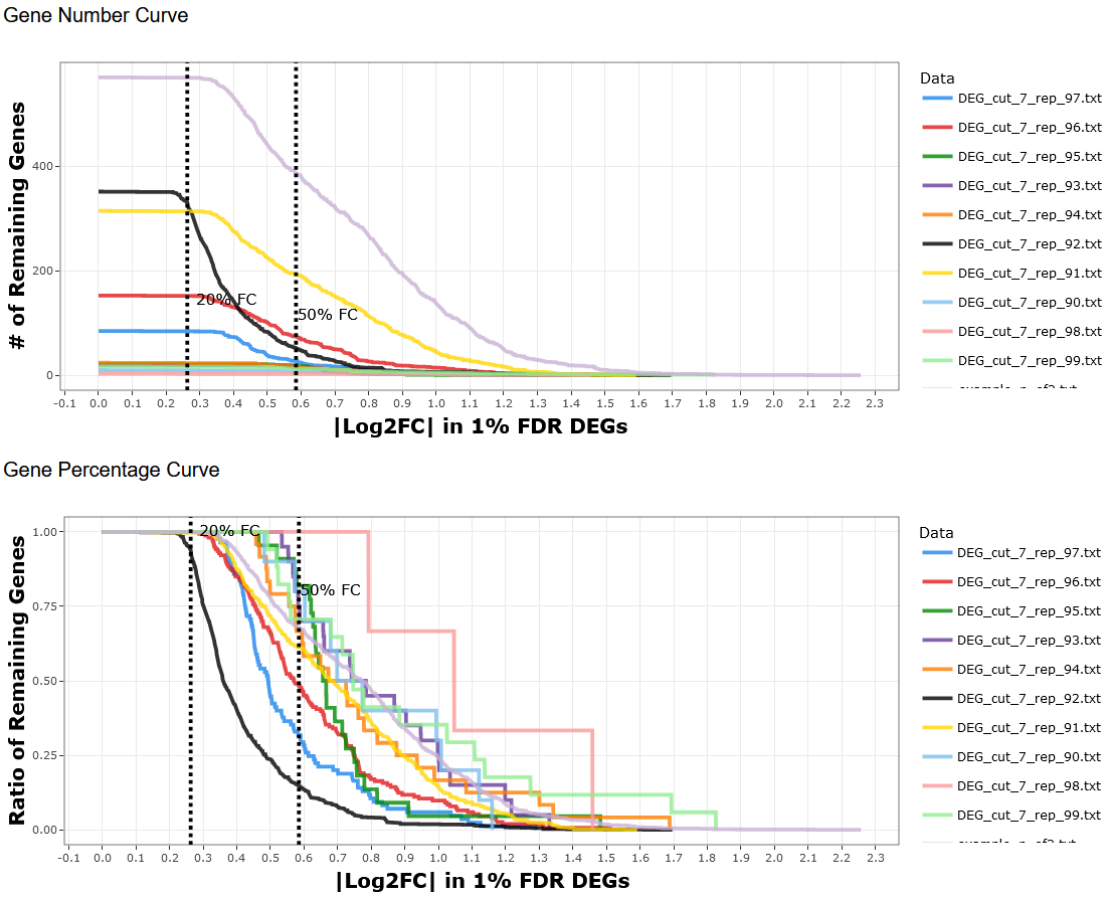



## Step 3: Elucidate your results

Below we give 2 examples for interpreting your results.



The result plots will be shown on the right side of the screen. Dotted lines are shown as % change, so “20% FC” means +/-1.2 the expression level. In this example, red, orange, and yellow are from the same raw data, but DEG analysis is generated with successively fewer samples (using n of 9, 6, and 3). This helps us understand the effect of different sample numbers in an experiment design. Besides the change in DEG # detection, the characteristics of effect size are also quite different. In percentage curve, lower n curves get shifted right due to especially poor detection of low effect size genes.




In this example, many different random 3vs3 drawings are used to produce DEG analysis. This gives us an idea of the variance inherent to n=3 differential expression experiments.

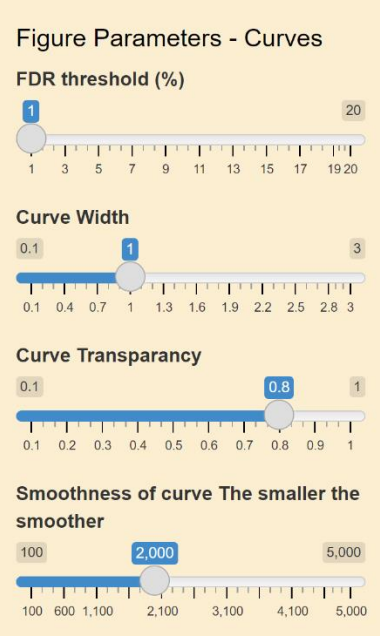
## Step4: Design your unique curves

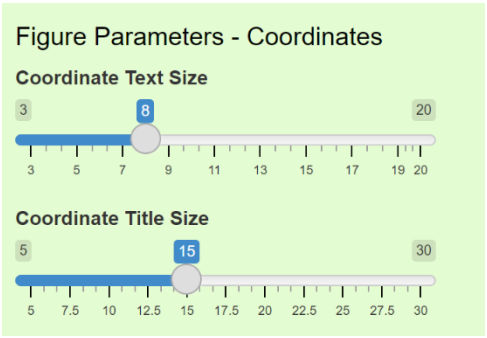
If you are not satisfied with the figures, try to tune the parameters on the left side of the screen. There are four main sections controlling the figure. After you tuned all parameters, you can click ***Plot*** to replot the figures. Figures will not update until you click ***Plot***.

First is the **Curve section** with a light orange background.

You can change the width of the curves and the transparency of the curves. If you uploaded many files, you may need thinner curves and more transparent color to clearly see all curves.

The *Smoothness of curve* determines the number of bins to calculate the cumulative sum. A larger number of this parameter will give you more jagged curves in higher resolution, but it will also increase the computational power to plot the curves. In contrast, a smaller number of this parameter will give you smoother curves in lower resolution, but it will take less computational power.



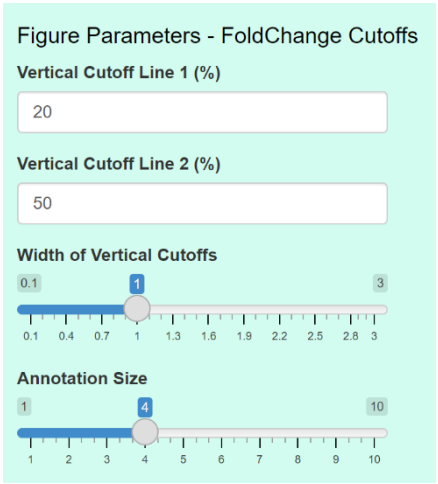

Second is the **Coordinates section** in light green background.

This section is mainly about the text and title size of the axes. If you found that in your downloaded figure, the x-y label or the coordinates are too small, you can tune these two parameters

Third is the **Cutoff sections** in light blue background.

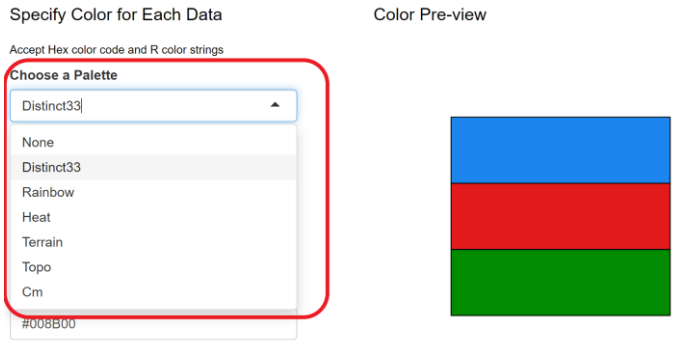
We provided two cutoff lines of fold-change for the users. You can input the fold-change number you are interested in, and you can also adjust the width of these vertical lines and their annotation size.

However, if you only need one vertical cutoff in your figure, you can set the other vertical cutoff to be a negative value and zoom in the figure to remove the cutoff before your download.

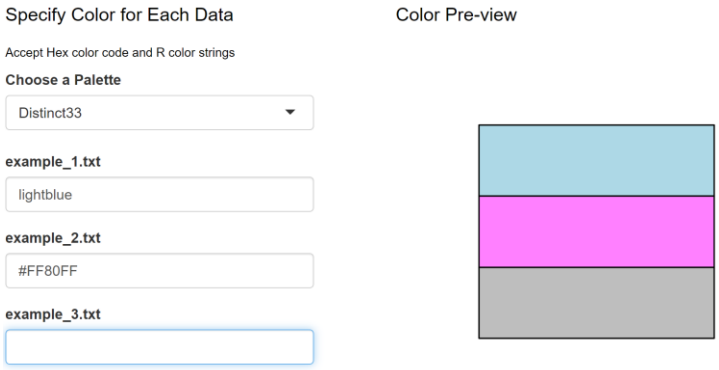



Last is the **Color section** below the figure.

We prepared several popular color palettes for the user to choose. Once you choose a palette, the color will be demonstrated on the right side.




If you don't like the color, you can designate your own color for each curve, and you can use one color for multiple curves. Our color section takes not only **Hex color code**, but also **R color strings**. As it shown below, you can type in either "lightblue" or "#FF80FF". If you don't give a color to the data, then the final curve will be grey. As the color pre-view is a real time reaction, you can quickly see the color you choose. After you decide the color and make sure all other parameters are fine, please click ***Plot*** to make your unique curves.




*Example data can be found via this link: https://github.com/LiuzLab/power_curves_git*