Project1 Document

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# 1. The dependencies

The important dependencies are listed below:

* 1. [Jupyter notebook](https://jupyter.org/) version 6.4.4
  2. [Python](https://www.python.org/) version 3.9.7.
  3. [NumPy](https://numpy.org/) version 1.21.2
  4. [matplotlib](https://matplotlib.org/) version 3.4.3
  5. [PIL](https://pillow.readthedocs.io/en/stable/) version 8.3.2

# 2. Instructions on using the script

There are indexes above each block. In figure 1, we can see the block that imports useful packages, the block that implements gaussian smoothing to given images.

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描述已自动生成Figure : Example of indexes

# 2.1 cells from #1 to #7

The cells from #1 to #7 are definitions and pre-works. Users should click each cell and execute them one by one, **EXCEPT** for cell #2, which doesn’t need to be run unless it is in [Colab](https://colab.research.google.com/). Basically, the functions of each cell are:

cell#1: import packages

cell#2: import packages that will be used in google Colab

cell#3: the function that applies gaussian smoothing

cell#4: the function that computes gradients of both horizontal and vertical direction

cell#5: the function that computes gradient magnitude and gradient angle

cell#6: the function that applies non-maxima suppression

cell#7: the function that implements p-tile algorithm

# 2.2 cell from #8 to #9

The cells that apply the functions defined above to a given image. If the user wants to apply the operations on another image, **PLEASE** change the ‘FILE’ variable in cell #8.1. Please look at Figure 2. Users should follow the sequence and execute each cell. Most of the cells would directly show the results. Cell #9 enables user to save the results after each operation. **PLEASE** change the file names you want to save in order not to overwrite the other results (Figure 3).

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Figure 2: modify cell#8.1 to choose another file

图片包含 散点图

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Figure : modify cell#9 to choose other names