CS172 Computer Vision I

Quiz 1

Closed book quiz!   **Answer in English**!

Name (in Chinese): _____   Student ID: _____

1. We have learned 2D convolution in class. Now please write down the result of the following convolution operation.

1	2	3
4	5	6
7	8	9

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-1	-2	-1
0	0	0
1	2	1

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2. K-Means is a well-unknown clustering algorithm. The basic steps of the K-means algorithm are as follows, please fill the blanks:

   Algorithm:
   - Random initialize K cluster centers.
   - Iterate until convergence:
     - _____(a)_____
     - _____(b)_____

3. In K-Nearest Neighbor algorithm, it is tricky to choose K. Please discuss how different K affects performance. (Hint: what happens when K is small/large?)

There are also problems on the back!

4. Many machine learning algorithms require hyperparameters, such as K in K-Means and KNN. Please state how to choose hyperparameters.

5. Term Frequency (TF) and Inverse Document Frequency (IDF) are two basic concepts in the Bag of Features.
   (a) Considering a document containing 100 words wherein the word *cat* appears 8 times. Please compute Term Frequency (TF) for *cat*.
   (b) Assuming we have 1 million documents, and the word *dog* appears in one thousand of these documents. Please compute Inverse Document Frequency (IDF) for *dog*.