

國立成功大學
110學年度碩士班招生考試試題

編 號：188

系 所：電腦與通信工程研究所

科 目：人工智慧概論

日 期：0203

節 次：第 1 節

備 註：不可使用計算機

※ 考生請注意：本試題不可使用計算機。請於答案卷(卡)作答，於本試題紙上作答者，不予計分。

1. (10%) Under what conditions is k -fold cross-validation the same as leave-one-out cross-validation?

2. (15%) For the below questions, consider a dataset containing six one-dimensional points: {2, 4, 7, 8, 12, 14}. After three iterations of **Hierarchical Agglomerative Clustering** using Euclidean distance between points, we get the 3 clusters: $C_1 = \{2, 4\}$, $C_2 = \{7, 8\}$ and $C_3 = \{12, 14\}$.

(a) What is the distance between clusters C_1 and C_2 using **Single Linkage**?

(b) What is the distance between clusters C_1 and C_2 using **Complete Linkage**?

(c) What clusters are merged at the next iteration using **Single Linkage**?

3. (10%) True or false (and explain why)? In general, it is possible that after new cluster centers are computed by the k -Means Clustering algorithm, a cluster center may be associated with an empty cluster (i.e., with zero points in it).

4. (10%) True or false (and explain why)? To find the best number of clusters, k , to use with k -Means Clustering for a given dataset, you should pick the value of k that *minimizes* the **distortion** measure of cluster quality.

5. (10%) True or False (and explain why)? The back-propagation algorithm, when run until a minimum is achieved, always finds the same solution (i.e., weights) no matter what the initial set of weights are.

6. (10%) True or False (and explain why)? CNNs (Convolution Neural Networks) can learn to recognize an object in an image no matter how the object is translated (i.e., shifted horizontally and/or vertically) even if the training set only includes that object in one position.

7. (10%) True or False (and explain why)? CNNs (Convolution Neural Networks) can learn to recognize an object in an image no matter how the object is rotated (in the image plane) even if the training set only includes that object in one orientation.

8. (10%) True or False (and explain why)? Given a linearly-separable dataset for a 2-class classification problem, a Linear SVM is better to use than a Perceptron because the SVM will often be able to achieve better classification accuracy on the testing set.

9. (15%) The table below shows a training set with 10 examples that is used for training a **3-nearest-neighbors classifier** that uses Manhattan distance, i.e., the distance between two points at coordinates p and q is $|p - q|$. The only attribute, X , is real valued, and the label Y has two possible classes, 0 and 1. What is the **2-fold cross validation accuracy** (percentage correct classification)? The first fold contains the first 5 examples, and the second fold contains that last 5 examples. In case of ties in distance, use the example with smallest X value as the neighbor.

X	0	1	2	3	4	5	6	7	8	9
Y	1	0	1	0	1	0	1	0	1	0