亞洲大學 博士班資格考 試題

文件編號：AC-0054
機密等級：2 限閱

考試日期：111 年 8 月 3 日

考試科目	機器學習	系所別	人工智慧博士學位學程	命題教師	

1. Machine learning techniques are often used to solve regression and classification problems. For a certain application, regression techniques can often be used to solve classification problems, or vice versa. **Please explain the fundamental differences in techniques for solving regression or classification problems from a technical point of view.**(20 points)

2. Most of the problems to be solved by machine learning techniques, the data are mostly assumed to be normally distributed (linear). However, when the number of data is small, the data is often non-normal distribution (non-linear). **Therefore, what technique(s) may be incorporated into machine learning methods to solve problems with non-normal distributions.** (20 points)

3. While training a machine learning model, we may notice that the model's error remains large even after many training iterations. We can determine that this error results from overfitting. Will changing the complexity of the hypothesis class successfully reduce the error? If so, how should the complexity be changed? If not, why not? Explain the concept of overfitting in more detail. (20 points)

4. Explain the concept of VC dimension (Vapnik–Chervonenkis dimension) and determine the VC dimension of Perceptrons. (20 points)

5. Convolutional neural networks (CNN) can be applied to the image recognition. Please answer the following questions: [1] What is the primary function of the convolutional layer? (3 points) [2] What is the primary function of the max-pooling layer? (3 points) [3] Can the recognition accuracy be improved by increasing the number of convolutional layers? Please explain your answer. (4 points)

6. The Generative adversarial network (GAN) is beneficial in generating a specific image. Please answer the following questions: [1] What is the primary function of the generative network? (3 points) [2] What is the primary function of the adversarial network? (3 points) [3] Can the adversarial network generate the desired image? Please explain the reason? (4 points)