

**Midterm Exam**

..... رقم التسجيل:

..... الاسم:

**Instructions:** Time **60** min. Open book and notes exam. No electronics. Please answer all problems in the space provided and limit your answer to the space provided. There are six problems.

**P1.** Given the three readers' roles shown in the following table, specify for each report content shown its relative length with respect to the three roles. In each of the 12 cells, enter **Short**, **Medium**, or **Long**. In each row, don't use the same response more than once, *i.e.*, your responses in each row should be relative to the three roles.

[4 marks]

Report Content	Readers' Role		
	Entertain Me	Help Me Solve My Practical Problem	Help Me Understand Something Better
Theoretical Background	<b>Medium</b>	<b>Short</b>	<b>Long</b>
Procedure	<b>Short</b>	<b>Long</b>	<b>Medium</b>
Reason and Evidence	<b>Medium</b>	<b>Short</b>	<b>Long</b>
Acknowledgments and Responses	<b>Long</b>	<b>Short</b>	<b>Medium</b>

**P2.** Identify the **research problem** of the following abstract of a published journal paper. In the space below, give your best deduction of the *research topic*, the *main research question*, and the *significance* of solving this main research question. Note that the significance is not explicitly stated in this abstract, but it can be inferred.

[6 marks]

***Abstract:** In recent years, with the rise of the neural network and deep learning, significant progress has been achieved in the field of image recognition. Convolutional Neural Network (CNN) has been widely used in multiple image recognition tasks, but the recognition accuracy still has a lot of room for improvement. In this paper, we proposed a hybrid model CNN-GRNN to improve recognition accuracy. The model uses CNN to extract multilayer image representation and it uses General Regression Neural Network (GRNN) to classify image using the extracted feature. The CNN-GRNN model replaces Back propagation (BP) neural network inside CNN with GRNN to improve generalization and robustness of CNN. Furthermore, we validate our model on the Oxford-IIIT Pet Dataset database and the Keck Gesture Dataset, the experiment result indicate that our model is superior to Gray Level Co-occurrence (GLCM), HU invariant moments, CNN, and CNN\_SVM on small sample dataset. Our model has favorable real-time characteristics at the same time.\**

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**Topic: Small sample image recognition using improved Convolutional Neural Network (CNN)**

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**Question: How to improve the recognition accuracy of CNNs on small-sample datasets?**

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**Significance: Improves the applicability of using CNNs in image recognition**

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**P3.** From the following abstract of a published journal paper, identify the main paper's *claim*, two *reasons*, *evidence*, and implied two *warrants*.

[6 marks]

**Abstract:** *In recent years, with the rise of the neural network and deep learning, significant progress has been achieved in the field of image recognition. Convolutional Neural Network (CNN) has been widely used in multiple image recognition tasks, but the recognition accuracy still has a lot of room for improvement. In this paper, we proposed a hybrid model CNN-GRNN to improve recognition accuracy. The model uses CNN to extract multilayer image representation and it uses General Regression Neural Network (GRNN) to classify image using the extracted feature. The CNN-GRNN model replaces Back propagation (BP) neural network inside CNN with GRNN to improve generalization and robustness of CNN. Furthermore, we validate our model on the Oxford-IIIT Pet database and the Keck Gesture dataset, the experiment result indicate that our model is superior to Gray Level Co-occurrence (GLCM), HU invariant moments, CNN, and CNN\_SVM on small sample dataset. Our model has favorable real-time characteristics at the same time.\**

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**Claim:** **The hybrid model CNN-GRNN improves CNNs in image recognition**

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**Reason 1:** **This model improves the recognition accuracy.**

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**Reason 2:** **This model improves the recognition speed.**

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**Evidence:** **Experimental results on the Oxford-IIIT Pet database and the Keck Gesture dataset**

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**Warrant 1:** **More accurate machine learning models are better than less accurate models.**

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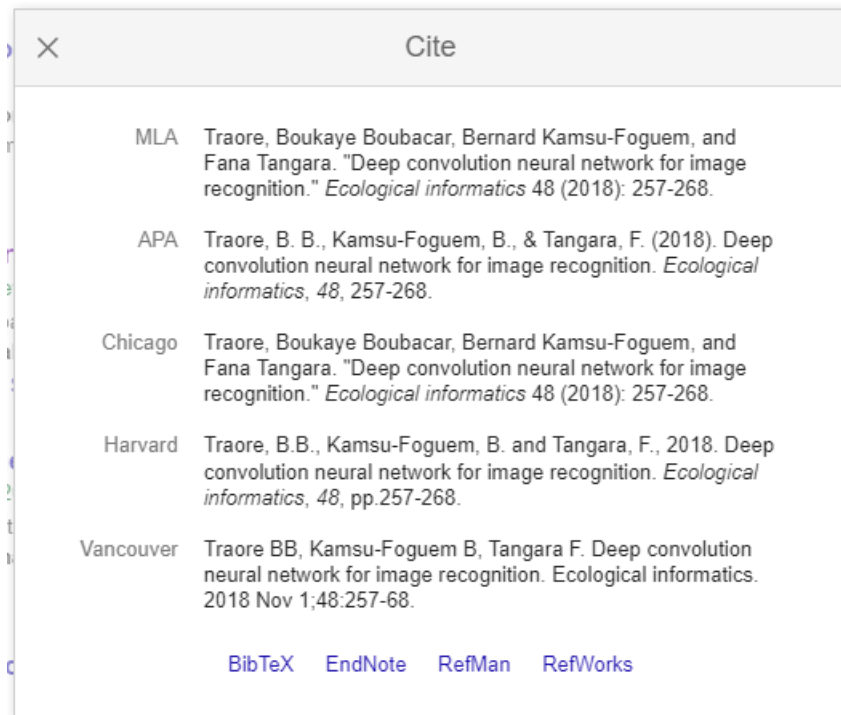
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**Warrant 2:** **Faster machine learning models are better than slower models.**

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P4. The following screenshot is from Google Scholar's cite feature. In the space provided below, introduce this paper in one sentence, cite it, and create a reference entry for it using IEEE Conference style. [6 marks]



**Introduction Sentence:**

**Traore *et al.* used deep neural networks for image recognition [1].**

**Reference Entry:**

**[1] B. Traore, B. Kamsu-Foguem, and F. Tangara, "Deep convolution neural network for image recognition," *Ecological informatics*, vol. 48, pp. 257–268, Nov 2018.**

**P5.** Define **plagiarism** and provide three examples of actions that could be considered as plagiarism in an academic setting.

*[4 marks]*

**Definition: Plagiarism is the act of presenting someone else's ideas, words, or work as one's own without giving proper credit.**

**1. Copying and pasting information from a source without proper citation.**

**2. Paraphrasing another person's work without providing adequate attribution.**

**3. Submitting a paper written by someone else as your own, whether purchased or obtained from a peer.**

P6. With reference to the **Principled Artificial Intelligence** subject explained in the class, give short descriptions of the following four principles.

[4 marks]

1. **Consent:** refers to obtaining explicit permission from individuals before collecting, processing, or utilizing their personal data.

2. **Right of Erasure:** grants individuals the ability to request the removal of their personal data from AI systems and databases.

3. **Explainability:** emphasizes the need for AI algorithms to provide understandable explanations for their outputs.

4. **Inclusiveness:** seeks to prevent AI systems from perpetuating or exacerbating existing societal biases and disparities, promoting equitable outcomes for all individuals.

<Good Luck>