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Computer science

Higher level

Paper 3

30 October 2023

Zone A morning | **Zone B** morning | **Zone C** morning

1 hour

Instructions to candidates

- Do not turn over this examination paper until instructed to do so.
- A clean copy of the **computer science case study** is required for this examination paper.
- Read the case study carefully.
- Answer all questions.
- The maximum mark for this examination paper is **[30 marks]**.

Answer **all** questions.

1. (a) Identify **two** resources available in infrastructure as a service (IaaS). [2]
(b) Define the term *hyperparameter* in the context of machine learning. [2]

 2. (a) Jungmin and Lijing have suggested that users' implicit behavioural data should be stored and used to personalize adverts.

Explain how the use of implicit behavioural data to personalize adverts could compromise a user's right to anonymity. [4]
(b) Many recommender systems suffer from popularity bias.

Explain how popularity bias can be managed by a recommender system. [4]

 3. Matrix factorization utilizes a user–item interaction matrix to recommend content to users (see **Figure 4**).

Describe the steps that are required to recommend content. You can assume that the user–item interaction matrix has already been created. [6]

 4. A recommender system that uses a supervised learning K-nearest neighbour (k-NN) algorithm is selected. Supervised learning algorithms require several decisions to be made, including setting any hyperparameters, choosing datasets, training and testing procedures, and evaluation strategies.

Discuss whether the selection and implementation of a k-NN algorithm in the development of a recommender system will give precise and accurate recommendations. [12]
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