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FOF

to the AI
tasks, and
technical
like

12 Pages

Instructions to Candidates

1. Please give the information requested in the boxes below.
2. Enter your name in the space provided to the right, fold over the label provided and seal down (using the label provided) to hide your name.
3. The answers must be legibly written. The Examiners can either ignore illegible script or have it typed and the expense of typing charged to the candidate.
4. Write your answers in ink.
5. Begin each answer on a fresh page. Do all rough work in the answer book and cross it through.
6. No part of this book is to be torn out; it must be handed in complete.
7. If more books than one are used, fasten them together using the tags available from the invigilator(s).
8. **Every book must be handed in. In no circumstances may answer books, used or unused, be taken out of the examination venue.**

1	Student Number	2300260
2	Title of Examination Paper	Artificial Intelligence
3	Module Code	ACCA7026
4	Date and Time of Examination	8/5/2024
5	Examination Venue	310
6	Seat Number	014
7	Number of Answer Books handed in	

[illegible]

(Gweler yr ochr arall am y fersiwn Cymraeg)

46 ~~40~~
57.5%

57.5%

1.1 Clinical assistance.

Weak AI, known as narrow AI, refer to the AI system designed to handle specific tasks, and trained on specific dataset. For the clinical assistance, we can use some techniques like tokenization, word embedding and padding to construct a dataset, whose input is the numerical vector converted from patient records, and output is the healthy state of someone. Then we can train a model to predict someone's healthy data like blood pressure, even this people do not come to hospital for a long period, but we have the records of this one.

Strong AI, known as general AI, refer to the AI system that can learn, understand and apply knowledge in the way that is same as human being. So, the final goal of ~~our~~ clinical assistance is to design a strong AI which is indistinguishable from a real doctor, utilize professional knowledge, keep studying in practice and become smarter and smarter. Then this clinical assistance can make clinical decision with high accuracy and speed. This process may need massive data, which includes all knowledge and experience from real doctor.

Selected as ?

12. Using several data to do some simple predict like blood pressure.

✓
2

2/3

13 learn, understand and apply professional knowledge and experience for decision making.

1/3

1.4 Performance measure: speed of clinical decision making. healthy state of the patient who follow the decision made by AI, disparities of decision between real doctor and AI.

Environment: patient records, medical information, feedback from real doctor and patient.

Sensors: interface of the database, internet, keyboard and microphone.

Actuator: output decision in the monitor or by voice.

Sen

1.5. 1. Fairness, both patient

explain 9 in the content of story / week AI

2. human respect of human autonomy.

3. explicability: the decision should be explainable to those directly or indirectly affected and process should be transparent.

in the context of story

4. prevention of harm, wrong decision may kill the patient.

2/5/20

11

$$\begin{aligned}
 3.1 \quad UCB &= U_i + C \sqrt{\frac{\ln N}{n_i}} \\
 &= 0.8 + 1.5 \times \sqrt{\frac{\ln 80}{15}} \\
 &= 1.61
 \end{aligned}$$

3.2.1 ~~unsupervised learning~~, the transactions are not labeled as unauthorized or authorized. We can use clustering algorithm like KNN to ~~spe~~ separate them.

3.2.2 ~~supervised learning~~. construct a dataset, whose input ~~is~~ are subjects, content, themes, and output is class or group. Then train a model to handle this multiple classification task.

3.2.3 ~~Reinforcement learning~~. ~~its~~ using the amount of products bought by customer as performance measure.

3.2.3 Reinforcement Learning
 Performance measure: sales in e-commerce, retail and media industries
 Environment: preferences, purchase, browsing history, demographic information.
 Actuator: product recommendation.
 Sensors: get customer's information.

3.2.4 Reinforcement Learning: a ~~sequence~~ of actions can be done to minimize ~~cost~~ cost and maximize customer's satisfaction.

Q3 = 11/20

- 4.1
1. data-preprocessing: using Min-Max normalization to scale all features to the range from 0 to 1. *preprocess*
 2. Split dataset into train set (80%) and test set (20%) *part of training*
 3. construct a MLP neural network, using ReLU activation function for hidden layer, sigmoid for output layer.
 4. Add dropout to neural network to avoid overfitting. select an optimisation (Adam, SGD).
 5. Set hyperparameter such as batch size, learning rate.
 6. train model on train set and test model in test set.
 7. Fine-tune hyperparameter, structure of neural network (number of hidden layer, number of neurons in each layer).

42.1.

8

0/1

42.2.

0/1

42.3.

1. the data points with missing value are randomly distributed in data set.

2.

0/1

1/2

43.

We can take GRE Scores, TOEFL Scores, University rating, SOP, LOR, CGPA, Research. Admit as input feature and take admit as output. Because the value of output is 1 or 0, we can take it as positive and negative class.

0/1

Binary
classification
problem

3

1

4

4.4 Sigmoid is the best activation function for this task. The value of admit is 0 or 1, by using sigmoid, we can get the probability for student's admit.

2/✓
1/6

4.5 Model performed well on the train set, but perform poorly in test set. (accuracy for this binary classification)

1. the number of training epoch is too large.
2. model is too complex or data is too less.

02
3/✓
4

4.6.1

		predicted.	
		Accepted	Rejected
Actual	Accepted	150	15
	Rejected	30	5

$$TP = 150$$

$$TN = 5$$

$$FP = 30$$

$$FN = 5$$

4.6.2

$$\text{precision} = \frac{TP}{TP + FP} = \frac{150}{150 + 30} = 0.83$$

$$\text{recall} = \frac{TP}{TP + FN} = \frac{150}{150 + 5} = 0.97$$

$$F1\text{-Score} = \frac{2 \times \text{precision} \times \text{recall}}{\text{precision} + \text{recall}} = 0.89$$

precision means the accuracy of positive
class. recall means the sensitivity.