Test Project (Offline)

BRICS-FS-26_Artificial Intelligence

Computer Vision Application

2022 BRICS Skills Competition

Catalogue

Module 1: Requirements document analysis (10 marks) 3
Question 1: Analysis of model applications 3
[Function Description] 3
[Task requirements] 3
[Project Code] 3
Question 2: Model building process and considerations 3
[Function Description] 3
[Task requirements]. 4
[Project Code] 4
Module 2: Data Processing (35 marks) 5
Topic 3: Image data cleaning 5
[Function Description] 5
[Task requirements]. 5
[Project Code] 5
Topic 4: Image pre-processing 5
[Function Description] 5
[Task requirements]. 6
[Project Code 6
Topic 5: Data Visualisation 6
[Function Description] 6
[Task requirements] 6
[Project Code] 7
Module 3: Model Training and Prediction (50 marks) 7
Topic 6: Model construction and training 7
[Function Description] 7
[Task requirements] 7
[Project Code] 8
Question 7: Model evaluation and forecasting 8
[Function Description] 9
[Task requirements] 9

[Project Code] 9
Module 4: Professionalism (5 marks) 9
Topic 8: Professional quality 9
[Task requirements] 9

Module 1: Requirements document analysis (10 marks)

Question 1: Analysis of model applications

[Function Description]

Based on the product requirements analysis document provided, explain the role of the specified model and add the application scenarios and implementation process of the model.

[Task requirements]

Describe the application scenario of the model, the product positioning corresponding to the model.

[Project Code]

Get the relevant information from the "01_Model Application Analysis" folder under the path "Competition Questions/01_Requirements_Document_Analysis/" on the desktop and save the results to the "Submit_Document/01" folder on the desktop. " folder.

Question 2: Model building process and considerations

[Function Description]

It has been said that the thousands of years of history of hostility between cats and dogs is mainly due to the brutal competition caused by the forced competition for survival resources over a long evolutionary period; it has also been said that it is due to their inherently different communication styles; in

order to avoid being demolished by these guys, cats and dogs need to be separated and a cat-dog dichotomy model now needs to be constructed.

[Task requirements].

The model building process and its considerations are described in accordance with the model introduction in the functional description. The model building process includes data collection, data processing, model training, model testing, model preservation, etc.

Figure 1: Schematic diagram of cat and dog dichotomy

[Project Code]

Get the relevant information from the "02_Model Building Process and Notes" folder under the path "Competition Questions/01_Requirements_Document_Analysis/" on your desktop, and save the results to the "Submit_Documents/01" folder on your desktop. " folder.

Module 2: Data Processing (35 marks)

Topic 3: Image data cleaning

[Function Description]

The quality of the data largely determines the accuracy of the subsequent model training. The image dataset is cleaned to output clear and complete images that match the labelled categories.

[Task requirements].

After reading the desired data set, remove abnormal images, blurred images, similar images, remove single channel images, etc. that cannot be loaded.

Figure 2: Diagram of a blurred image

[Project Code]

Get the relevant information from the "03_Image Data Cleaning" folder under the path "Competition Questions/02_Data Processing/" on your desktop and save the results to the "Submit Documents/02" folder on your desktop. Folder.

Topic 4: Image pre-processing

[Function Description]

Pre-processing operations are carried out on the image dataset so that the

number of images of various categories is evenly distributed and reasonable to meet the requirements.

[Task requirements].

After reading the required data set, the images are binarised, enhanced, etc.

[Project Code

Get the relevant information from the "04_Image_Preprocessing" folder under the path "Competition Questions/02 Data Processing/" on the desktop and save the results to the "Submit Documents/02" folder on the desktop. Folder.

Topic 5: Data Visualisation

[Function Description]

A simple graph showing the distribution of the data set based on the given data set.

[Task requirements]

Completing the code to show a comparative graph of the distribution of data for each category

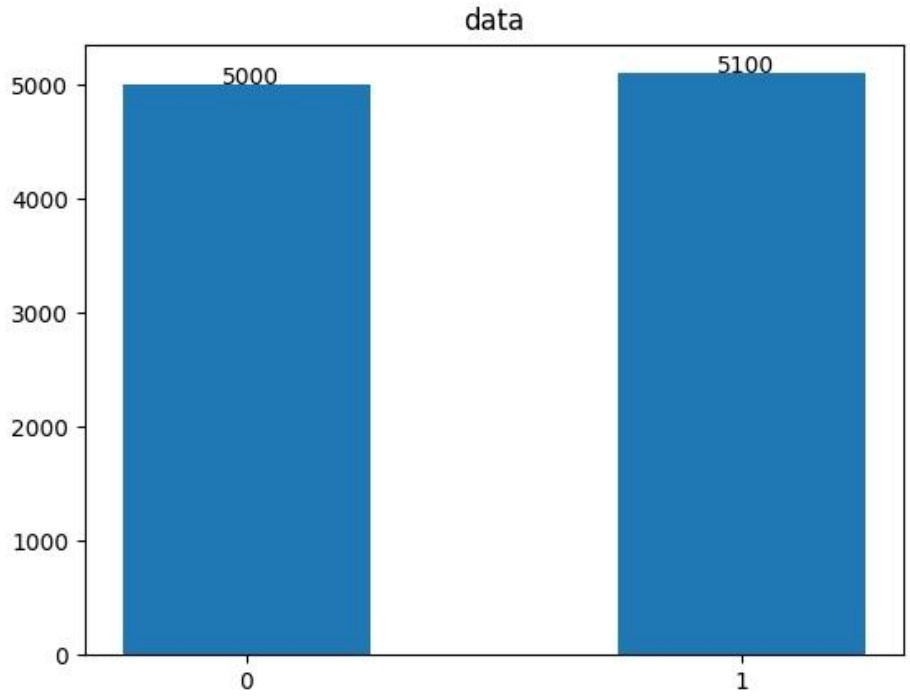

Figure 3: Schematic of the bar chart

[Project Code]

Get the relevant information from the "05_Data_Visualisation" folder under the path "Competition Questions/02 Data Processing/" on your desktop and save the results to the "Submit Documents/02" folder on your desktop. Folder.

Module 3: Model Training and Prediction (50 marks)

Topic 6: Model construction and training

[Function Description]

The training of the model is completed based on the data provided.

[Task requirements]

1. writing data loading functions.

2. partitioning of data sets according to the requirements of the task.

3. construction of deep learning models and loss functions.

4. Write model training related code and complete model training

5. Use the visualisation library Matplotlib to visualise the training process, such as loss value changes, accuracy changes, etc.

6. Save the trained model.

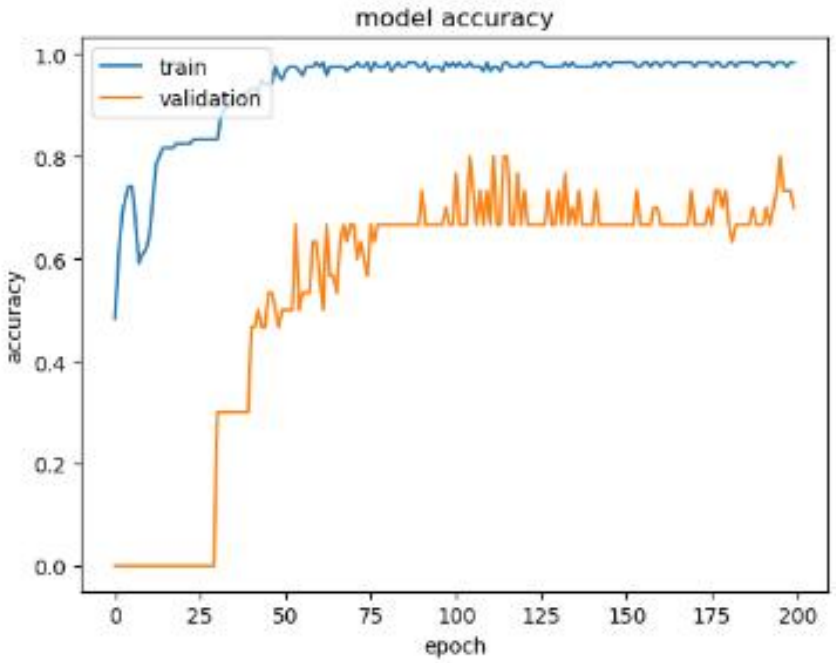

Figure 4: Example graph of change in accuracy

[Project Code]

Get the relevant information from the "06_Model Construction and Training" folder under the "Tournament Questions/03_Model Training and Prediction/" path on your desktop and save the results to the "Submit Documents/03" folder on your desktop. " folder.

Question 7: Model evaluation and forecasting

[Function Description]

Construct a model evaluation function to test the effect of the model saved in question 6 and plot the ROC curve.

[Task requirements]

1. Write code to construct a model evaluation function to evaluate the accuracy, recall and F1 values of the model on the validation set and save the results.

2. Build the model prediction function, input the test set to see the prediction results of the model and save the results.

3. Plot the ROC curve and save the results.

4. Use the trained model to make predictions on the test dataset, calculate accuracy, precision, recall, F1 value and other related metrics, and save the results.

[Project Code]

Get the relevant information from the "07_Model Evaluation and Prediction" folder under the "Tournament Questions/03_Model Training and Prediction/" path on your desktop and save the results to the "Submit Documents/03" folder on your desktop. " folder.

Module 4: Professionalism (5 marks)

Topic 8: Professional quality

[Task requirements]

The competitors shall follow the rules of operation, observe the discipline of

the examination room, keep everything clean and tidy, have good safety awareness, and compete in a civilized manner.