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Computer Science – Term 3 (2020-21)
Grade 10 – Project Documentation

Student Details:

Student ID. / رقم الطّالب			
Student Name / اسم الطّالب			
School Name / اسم المدرسة	Enter your School's name.		
Subject / المادّة	**Computer Science**		
Grade & Stream /الصّف والمسار	**Choose an item.**		
Class / الشّعبة	Enter your class	**Date**	Enter the date.

Table of Contents:

Project Task	Description
Project Introduction	Image classification – ML model
Project Task 1	Traffic sings – Image classification

Instructions for each individual Project Task:

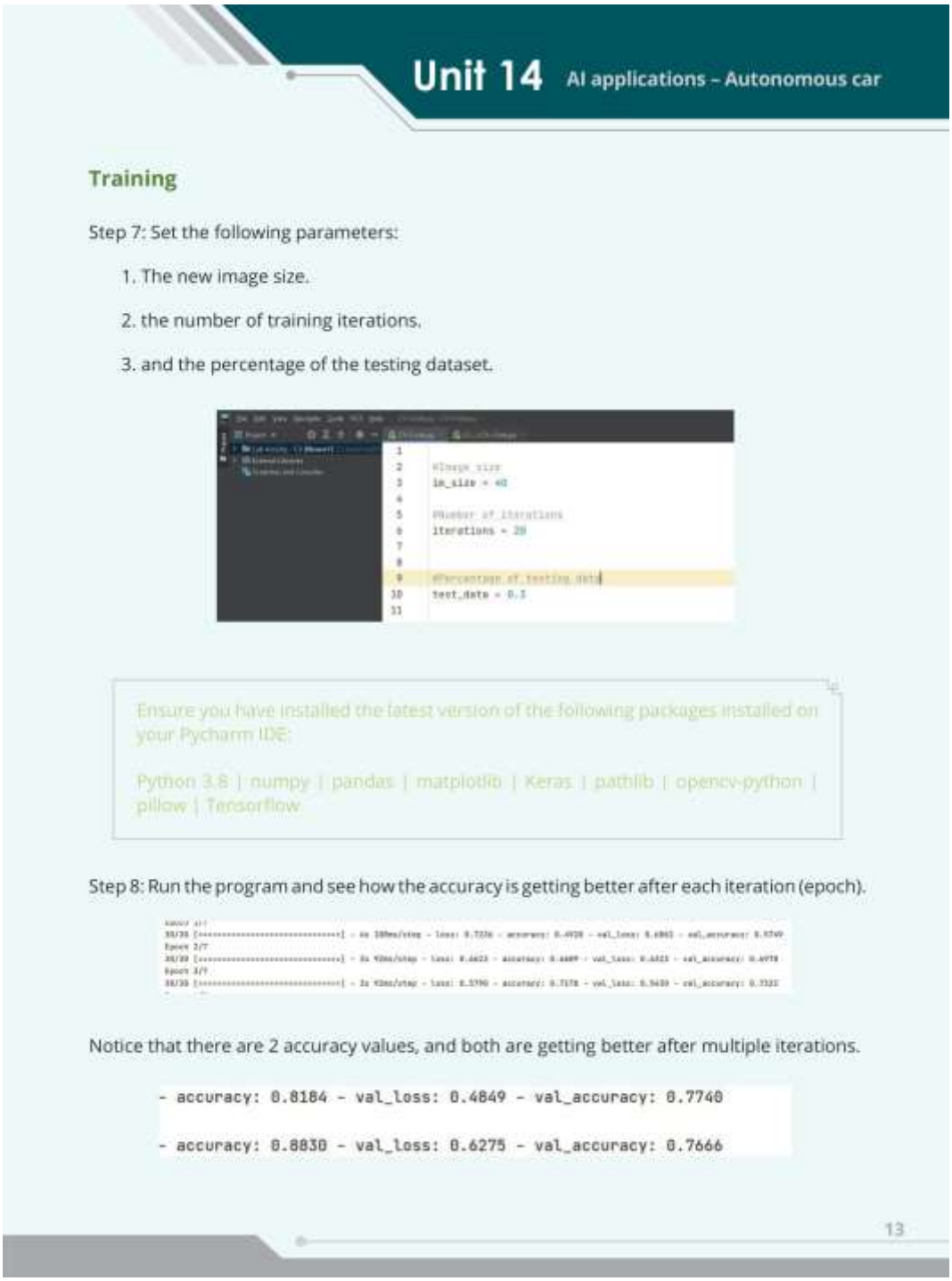
- ☑ Expand (► button) and complete each Project Task the same week your teacher assigns it.
- ☑ Write the activity book answers for each Project Task *(you can write them electronically here)*
- ☑ For each Project Task, please add screenshots/images of:
  - your Project Task *(to prove you ran the Python program)*

  Please note: Write a brief description for each screenshot/image taken.
- ☑ After completing, please submit this document back to your teacher through LMS for marking. *(LMS link: https://lms.moe.gov.ae)*

Project Introduction

Project Task 1

a) My Project Task 1 Completed Book Page Answers:



Unit 14 AI applications – Autonomous car

Training

Step 7: Set the following parameters:

1. The new image size.
2. the number of training iterations.
3. and the percentage of the testing dataset.

```
#Image size
im_size = 40

#Number of iterations
iterations = 20

#Percentage of testing data
test_data = 0.3
```

Ensure you have installed the latest version of the following packages installed on your Pycharm IDE:

Python 3.8 | numpy | pandas | matplotlib | Keras | pathlib | opencv-python | pillow | Tensorflow

Step 8: Run the program and see how the accuracy is getting better after each iteration (epoch).

Notice that there are 2 accuracy values, and both are getting better after multiple iterations.

```
- accuracy: 0.8184 - val_loss: 0.4849 - val_accuracy: 0.7740

- accuracy: 0.8830 - val_loss: 0.6275 - val_accuracy: 0.7666
```

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The first accuracy refers to the model performance using the same data it was trained on. While the second one, val_accuracy, refers to the performance when using the testing dataset.

Note: your model accuracy might be higher or lower than the accuracy shown in the provided images.

1) What was the accuracy of the last iteration for your training dataset and testing dataset?

validation accuracy : 69.23%
accuracy : 95%

2) Explain why the accuracy of the training dataset is higher than the accuracy of the testing dataset.

Since the ML model was conditioned on the testing dataset it had already seen the images.
The tested dataset, on the other hand, was shielded from the model and had never been used before.

Testing

Step 9: After the model finishes its training, a window will pop up, as shown. You can now use the model that you trained to classify images on your computer. Press Choose an image button and pick a new image of a traffic sign that you need to classify.

Step 10: Press Classify image button and the program will display the label of that image based on the model prediction.

3) Was your trained model able to classify the images you chose correctly?

Yes it was able to classify the images , but some of them was classified wrong (about 2-3 images) .

4) If you choose an image of a random item that your model was not trained on, will it be able to classify it? Why?

No it will not ba able to classify it correctly ,

5) Change the number of iterations to 1, rerun the program. Write your observations on the training speed, accuracy, and val_accuracy. Explain why it changed.

The training finished faster than before but it was not accurate because the ML model was not given the opportunity to practice several times in order to increase accuracy.

6) Change the image size to 80 and rerun the program. Write your observations on the training speed, accuracy, and val_accuracy. And explain why speed and accuracy were changed.

The training has took more time but the accuracy and val_accuracy increased
Speed is changed because the image size is bigger , The model was trained with higher bits of data.
Accuracy changed because it can see more features .

7) Change the image size to 5 and rerun the program. Write your observations on the training speed, accuracy, and val_accuracy. And explain why speed and accuracy were changed.

The training took more time than (Size80) and the accuracy and val_accuracy decreased
Speed is changed because the image size is smaller , The model was trained with fewer bits of data.
Accuracy changed because it can't see all the features and the images where small

Unit 14 AI applications – Autonomous car

8) If the image of a traffic sign was captured in different light conditions, how can this impact the model's accuracy? Why?

The model's accuracy would suffer as a result. Since the training was performed on a small dataset, various lighting conditions were not taken into account.

9) Does the environment in the real world usually change? Mention how.

Yes, the environment does change. Some days the weather is rainy , windy or sunny

10) If an autonomous car had an accident in the real-world, discuss who should be responsible: the car manufacturer, the person in the car or the ML model.

The responsible will be the manufacturer because sometimes technology simply fails , As anyone who has tries t operate a regular vehicle knows , brakes can go bad and engines can fall

Unit 14 AI applications – Autonomous car

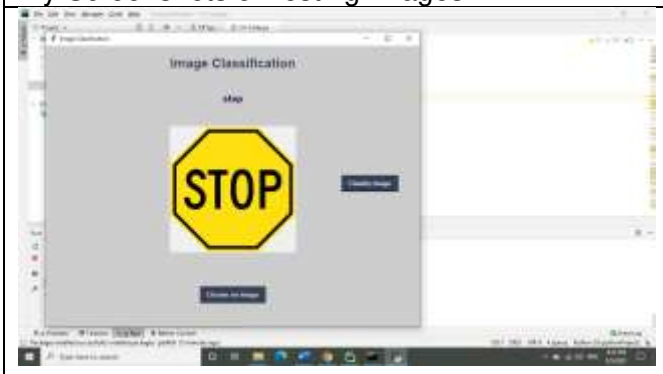
11) Mention some advantages of using an autonomous car.

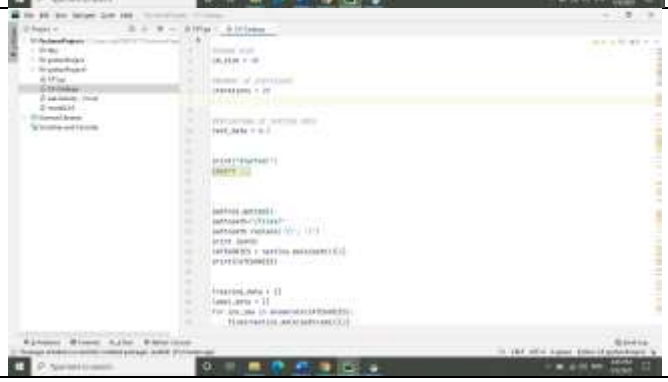
reduces emissions
road safety
economic benefits
less accidents
saving in fuel

12) Mention some disadvantages of using an autonomous car.

Wrong programming
Expensive
No privacy
Hacking issues

b) My Project Task 1 Screenshots & Testing Images:

My Screenshots & Testing Images	Screenshot/Image Description
	Image classification 'stop'
	Image classification 'right'
	Image classification 'traffic light'
	Image classification 'left'

	Accuracy – output
	Program