NGEE ANN POLYTECHNIC

School of InfoComm Technology

Deep Learning Assignment
Diploma in CSF / FI / IT
April 2020 Semester

ASSIGNMENT 1
(30% of DL Module)

18th May 2020 – 21st Jun 2020

Submission Deadline:
Presentation: 14th Jun 2020 (Sunday), 11:59PM
Report: 21st Jun 2020 (Sunday), 11:59PM

Tutorial Group	:	P01 / P02 /P03 /P04
Student Name	:	
Student Number	:	

Penalty for late submission:
10% of the marks will be deducted every calendar day after the deadline.
NO submission will be accepted after 26th Jun 2020 (Friday), 11:59PM.

1   Assignment Specifications

1.1   Objective

Build an image classification model to recognize and classify 10 different types of food.

1.2   Dataset

Download the dataset from Kaggle (https://www.kaggle.com/dansbecker/food-101). You may need to register an account with Kaggle if you have not already done so.

This dataset contains images of food, organized by the type of food (a total of 101 types). There are 1000 images for each type of food, so in total we have 101,000 images.

For the purpose of the assignment, you have been randomly assigned 10 types of food to perform classification and prediction on. **You are to refer to the Appendix at the end of this document to identify the food list file (.txt file) that is assigned to you.**

The **Image_Preprocessing.ipynb** Jupyter Notebook file is provided for you to extract the 10 types of food that are assigned to you. It will help you to split the images into training (750 images per food), validation (200 images per food) and testing samples (50 images per food). You only need to run this file once to generate the train, validation and test folders with the corresponding images. Do remember to run this file first before proceed to the below suggested tasks.

1.3 Suggested Tasks

You should make use of the **Assignment_1.ipynb** Jupyter Notebook file to implement your model. It is recommended to tackle this problem by using the suggested structure below.

Step 1 – Load Data

- Load the Train, Validation and Test images into Jupyter Notebook
- Resize all the images to 150 x 150 (recommended)
  - o If it takes too long for your computer to run, you can downsize the images to 50 x 50

Step 2 – Develop the Image Classification Models

- You are required to develop at least **TWO** different models, which can be:
  - models with different structures
  - models with similar structure but different hyperparameters or configurations

- For each model, you are suggested to follow the universal machine learning workflow to develop the model and improve the model performance, i.e.
  - Start with a baseline model
  - Scale up the model until overfitting occurs
  - Regularize the model accordingly

- Analyze and Compare the Model Performance during training phase
  - **Remember to record every model's performance curves** (i.e. training and validation accuracy, training and validation loss scores) during training phase

Step 3 – Evaluate the models using Test Images
- Evaluate the developed models using Test Images
- Analyze and compare the model performance during testing phase
- Recommend the best model

Step 4 – Use the Best Model to make prediction
- Based on your assigned food list, download at least **ONE** food image from the internet
- Feed the image into your Best Model and see whether the model can classify the food image correctly

1.4 Report Format & Content Guidelines

Write an **INDIVIDUAL** report with the following sections (see Table below).

Suggested content description and word count are provided for each section. You are free to include other relevant information you deem necessary in the sections.

*(Note: For a page with 1 inch margins, 12 point Arial font, and minimal spacing elements, a good rule of thumb is **500 words** for a single spaced page)*

	Suggested Report Sections & Content Guidelines	**Word Count**
1.	Table of Contents	NA
2.	Overview • Describe the problem, the objective and the approach.	Min: 500 words Max: 1000 words
3.	Data Preprocessing and Data Loading • Describe how you preprocess the data and load data into Jupyter Notebook	Min: 300 words Max: 500 words
4.	Develop the Image Classification Models (at least **TWO**) • Describe how you build the models and train the models • Analyze and Compare the models performance during training phase **You are recommended to utilize both pre-trained models and models trained from scratch.**	Min: 1000 words Max: 2000 words
5.	Evaluate models using Test images • Analyze and compare the models' performance during testing phase • Recommend the best model and explain why	Min: 500 words Max: 1000 words
6.	Use the Best Model to perform classification • Explain how to apply the model on a real life image • Explain and analyze the model prediction	Min: 300 words Max: 500 words
7.	Summary • Summarize your model performance and provide suggestions for further improvements	Min: 300 words Max: 500 words

2 Presentation and Demonstration

You are required to submit a **video recorded presentation** to showcase and demo your work. The video recorded presentation **should not exceed 5 minutes**. Video recorded presentations which exceed the allotted time will be penalized.

You must record your video presentation using **Microsoft Teams**.

After completion of your video recorded presentation, you are required to **submit the link to your video** (from Microsoft Stream). Instructions to submit your video recorded presentation link are provided in the following section.

You are also required to **submit the presentation slides used in your video recorded presentation** in MeL.

3 Deliverables

For this assignment, you must submit all the following:

1. A set of **Final Presentation Slides** in MeL

   - This is the set of final presentation slides which you will use to conduct your video recorded presentation

   - Deadline for the slides submission is **Sunday 14th Jun 2020, 2359 hours**

2. The **link to your video recorded presentation**

   - Submit the link to your video recorded presentation using the link below:

     - **Assignment 1 Video Presentation Submission Link**

       (Login using only your NP student account.

       Remember to grant view access to your tutor.)

   - Deadline for the zip file submission is **Sunday 14th Jun 2020, 2359 hours**

3. A softcopy **Final Report** via **SafeAssign** in MEL

   - Deadline for report submission is **Sunday 21st Jun 2020, 2359 hours**

4. The **completed "Assignment 1.ipynb"** Jupyter Notebook File in MeL

   - Deadline for Jupyter Notebook submission is **Sunday 21st Jun 2020, 2359 hours**

4 Grading Criteria

	Grading Criteria	**Component Weightage**
Video Recorded Presentation	a) Flow of presentation based on content guidelines (see section 1.4) b) Quality of presentation slides c) Presentation and articulation skills d) Presentation kept within 5 min limit	**50%**
Final Report	a) Completeness of report based on suggested report sections and content guidelines (see section 1.4) b) Quality of model building and evaluation c) Clarity of report and use of proper grammar d) Quality of recommendations for further improvements	**50%**

5 Appendix

Food List

Each student is assigned a **.txt file** which includes ten different types of food.

S/No	Class	Student Name	Assigned File
1	P01	AIDIL FARHAN B AMRAN	1.txt
2	P01	ANG SI HAO	2.txt
3	P01	CHIA KAI ZER	3.txt
4	P01	DARIEN TAN WEI HAO	4.txt
5	P01	DO LI FANG, SARAH	5.txt
6	P01	ELIJAH NG DING JIE	6.txt
7	P01	EWEN KECK JUN YUAN	7.txt
8	P01	GERRON LEE YAN FONG	8.txt
9	P01	GLADYS CHUA LING HUI	9.txt
10	P01	GOH JUN JIE, NICHOLAS	10.txt
11	P01	HANNAH LEONG JIA WEN	11.txt
12	P01	JEWEL JACE LIM	12.txt
13	P01	LIEW JING DE BENJAMIN	13.txt
14	P01	LIM RAY'EN	14.txt
15	P01	LIM YI JIE	15.txt
16	P01	MUHAMMAD ANAS B ISMAIL	16.txt
17	P01	NG TIANYU JERRIC	17.txt
18	P01	NG WAI KEET	18.txt
19	P01	PAE XIANG SHENG	19.txt
20	P01	SOH LIU JING MABEL	20.txt
21	P01	SOH QI HUI SELINA	21.txt
22	P01	TAN WEN HAO	22.txt
23	P01	TEO ZHI HAO	23.txt
24	P01	TSEN FAN LOONG	24.txt
25	P01	XIE ZHUOHAN	25.txt
26	P02	ALYSSA CHWEE BEI ER	26.txt
27	P02	BRADLEY GOH	27.txt
28	P02	BRYAN LEE YIXIAN	28.txt
29	P02	CHUA ZHE YU	29.txt
30	P02	DAINEL KOH CHYE LEK	30.txt
31	P02	DEBBIE HII WENXIN	31.txt
32	P02	EZRA HO JINCHENG	32.txt
33	P02	JASON CHUA YUAN ZHUANG	33.txt
34	P02	KERVIN ONG GUAN CHENG	34.txt
35	P02	LI ZIBIN	35.txt
36	P02	LIM JUN HAO	36.txt
37	P02	LIM KAI XIAN	37.txt

38	P02	MATTHIAS WEN-ZHONG BRUNO-JEAN MOREL GAN	38.txt
39	P02	NEO SAY PING	39.txt
40	P02	NG CHIN TIONG RYAN	40.txt
41	P02	NG RAY SON	41.txt
42	P02	ONG CHEE KUAN	42.txt
43	P02	RON JOSHUA ABES POLOYAPOY	43.txt
44	P02	SEAH LE	44.txt
45	P02	TAN JIA SHUN	45.txt
46	P02	TAN SHAW HERNG LUCAS	46.txt
47	P02	TAY QUAN YI	47.txt
48	P02	TEO SHI JIE	48.txt
49	P02	THADDEUS TEO E KAI	49.txt
50	P02	ZURIEL SHANLEY TANYORY	50.txt
51	P03	BENAIAH MARK MO DI	51.txt
52	P03	CHUA ZONG HAN, LIONEL	52.txt
53	P03	DARREN YEO YU XIONG	53.txt
54	P03	GERALD TAN LIANG CHEE	54.txt
55	P03	HENG GUAN XIANG	55.txt
56	P03	HENG WEI YAO	56.txt
57	P03	HO ZHEN XIAN	57.txt
58	P03	KENNY TAN SENG TENG	58.txt
59	P03	KIRTANARAM S/O HARIDASZ SHUNMUGAM	59.txt
60	P03	LAU YI LIN	60.txt
61	P03	LEE ZHI HONG, TIMOTHY	61.txt
62	P03	LEONG JING FENG	62.txt
63	P03	LEW JIAJUN	63.txt
64	P03	LIANG SHI YIN, MARCUS	64.txt
65	P03	LIM WEI XUAN, MARCUS	65.txt
66	P03	ONG SI HUI	66.txt
67	P03	P DHARSHANA NAIDU	67.txt
68	P03	SOO QIN LOONG MARCUS	68.txt
69	P03	SOPHIA CHONG JIA ROU	69.txt
70	P03	TAN SHI HAO	70.txt
71	P03	TAY JEUNG HONG	71.txt
72	P03	VINCENT SEAH CHONG KENG	72.txt
73	P03	ZHOU JIN CHENG	73.txt
74	P04	AARON TEO YUAN CAI	74.txt
75	P04	CHAN ZHI XIU	75.txt
76	P04	CHUA WEI KANG	76.txt
77	P04	DANIEL LEE JIA XIONG	77.txt
78	P04	GINNA TAI YUN MIN	78.txt
79	P04	KOH YAO HAO	79.txt
80	P04	LEE KAI XIN	80.txt
81	P04	LEE LI HAO	81.txt
82	P04	LEE WEI KIAT	82.txt

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83	P04	LIM XUE ER	83.txt
84	P04	LOW JIN YIK	84.txt
85	P04	MANICKAVASAGAM SUSHMITHA	85.txt
86	P04	NATHANIEL SEE WEI	86.txt
87	P04	NG JUN HAO	87.txt
88	P04	NG KAR WAI, ANDRE	88.txt
89	P04	NICHOLAS CHENG DE FEI	89.txt
90	P04	PHOEBE CHEONG QIAN MING	90.txt
91	P04	SEAH PEI EN	91.txt
92	P04	SIAH LI LING	92.txt
93	P04	TAN BUN HARN JASON	93.txt
94	P04	TAN KEE XIANG	94.txt
95	P04	TAN ZHE KAI	95.txt
96	P04	TOH SHAN FENG	96.txt
97	P04	WONG SHEEN KERR	97.txt
98	P04	ZHU JIAYUAN	98.txt