Republic of the Philippines
BATANGAS STATE UNIVERSITY
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College of Engineering – Department of Electrical Engineering

Midterm Examination
CpE415-Introduction to HDL
First Semester, AY 2022-2023

Course Code	CpEE 403
Course Title	Cognate/Elective3
Section	COE4101, COE4102, COE4103, COE4104
Date	October 18, 2022
Time	1:00-4:00 PM

SR-Code	Gallemit. Mark VIncent R.
Name of Student	19-00011

	SECTIONS	**POINTS**
1.	Programming	100
2.		
3.		
	TOTAL POINTS	**100**

ILOs	**Questions**	**Points**
1	Section I, II, III, IV and V	30
2	Section III, IV and V	70
3		
4		

Instructions to Students

GENERAL INSTRUCTIONS:

1. Follow every specified direction carefully.
2. Complete the necessary data fields on the questionnaire/python notebook.
3. Final submission of the python notebook should be converted in PDF Format. The final PDF should be filled up and signed digitally.

4. It's a two-part, 100-points, "open-everything" 5-hr online exam.
    - (80%) IPYNB + PDF Files.
    - (20%) Recording (min: 2mins, max:5mins). Demonstration with Explanations (English Only)
5. Strictly NO ERASURES. Any form of erasure is considered wrong.
6. You should refrain from any form of CHEATING. Anybody who shows any forms of cheating in the submitted files will receive a failing mark in this examination.
7. Submit. Review your answer

----------*EXAMINATION STARTS HERE*----------

I. PROBLEM STATEMENT

Define and explain the detection problem you want to solve. (Min of 100, Max 300 words)

Skin diseases are conditions that affect your skin. These diseases may cause rashes, inflammation, itchiness or other skin changes. Some skin conditions may be genetic, while lifestyle factors may cause others. Skin disease treatment may include medications, creams or ointments, or lifestyle changes. One of the most common skin diseases is Melanoma skin disease. Melanoma is caused by skin cells that begin to develop abnormally. Exposure to ultraviolet (UV) light from the sun is thought to cause most melanomas, but there's evidence to suggest that some may result from sunbed exposure. The type of sun exposure that causes melanoma is sudden intense exposure. It is deadly cancer, early detection and cure can save many lives. In 2022, it is estimated that 7,650 deaths will be attributed to melanoma — 5,080 men and 2,570 women. Research indicates that men with melanoma generally have lower survival rates than women with melanoma. Melanoma is more than 20 times more common in whites than in African Americans. Overall, the lifetime risk of getting melanoma is about 2.6% (1 in 38) for whites, 0.1% (1 in 1,000) for Blacks, and 0.6% (1 in 167) for Hispanics.

II. DATASET DESCRIPTION

Look for public datasets. Define and explain the dataset you will use. Include the link of where the public dataset downloaded (Min of 100, Max of 300 Words)

Skin Cancer Dataset:
https://www.kaggle.com/datasets/hasnainjaved/melanoma-skin-cancer-dataset-of-10000-images

Normal Skin Dataset
https://www.kaggle.com/datasets/drgfreeman/rockpaperscissors

The dataset will be used in this paper are provided below. Two datasets are used; one is for the melanoma skin disease dataset and for the normal skin dataset. Melanoma Skin Cancer Dataset contains 10000 images. This dataset will be useful for developing the deep learning models for accurate classification of melanoma. Dataset consists of 9600 images for training the model and 1000 images for evaluation of model. In this dataset, 300 are used for annotation and model training. In normal dataset, 300 images are used for annotation and model training. The dataset contains images of hand gestures from the Rock-Paper-Scissors game. The 2 datasets are used to determine the normal and skin disease.

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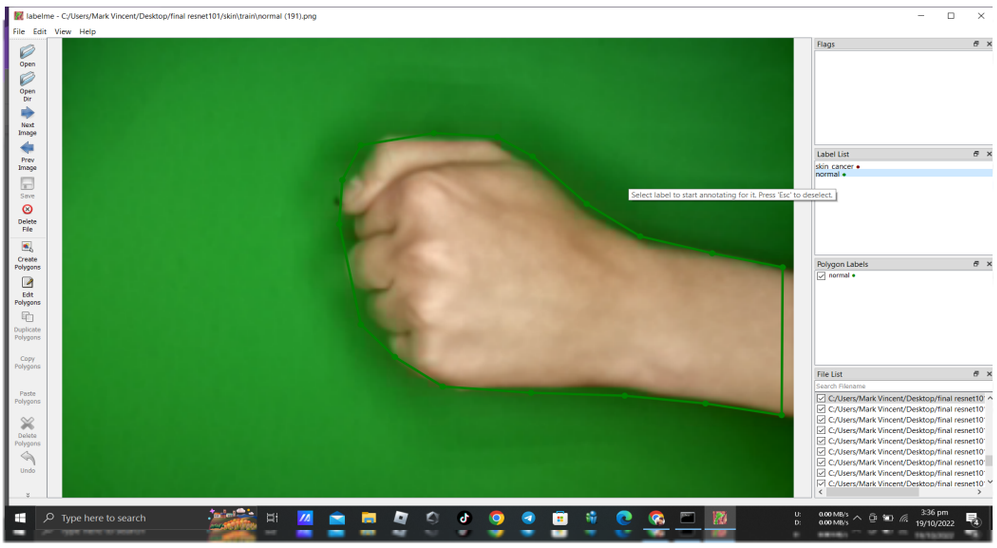
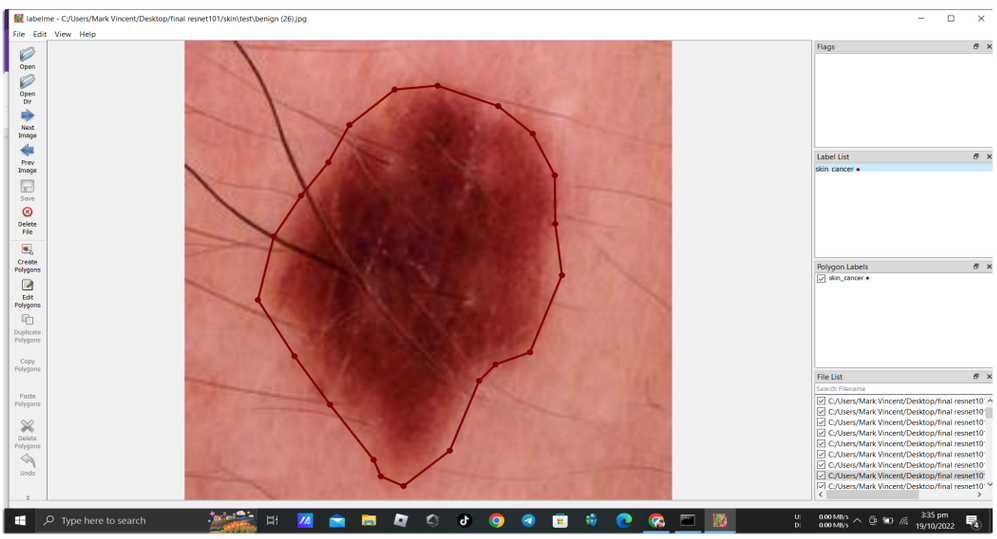
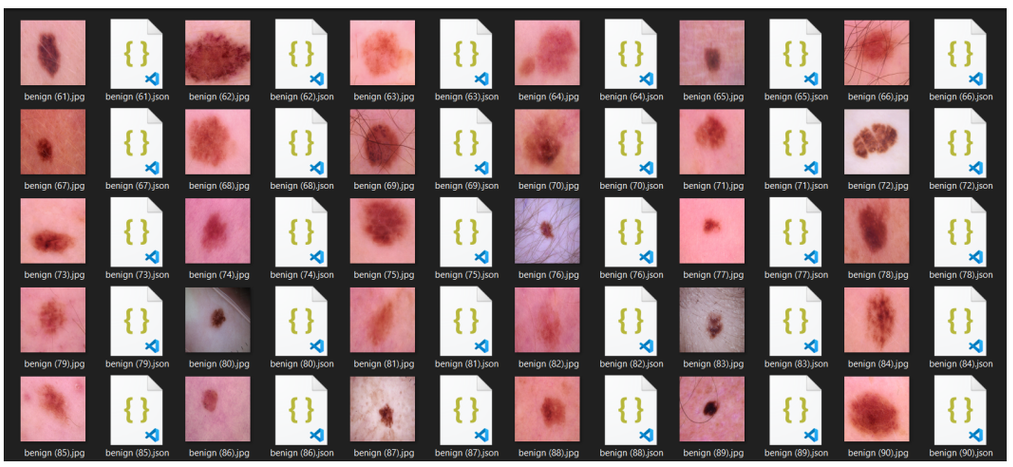
III. ANNOTATION

Insert sample screenshot of annotations and annotated JSON file







IV. TRAINING

1. Training code

```
import pixellib
from pixellib.custom_train import instance_custom_training

train_maskrcnn = instance_custom_training()
train_maskrcnn.modelConfig(network_backbone = "resnet101", num_classes= 2, batch_size = 4)
train_maskrcnn.load_pretrained_model("<insert pretrained model file>")
train_maskrcnn.load_dataset("<insert the file directory of the dataset>")
train_maskrcnn.train_model(num_epochs = 300, augmentation=True,  path_trained_models = "mask_rcnn_models")
```

```
import pixellib
from pixellib.custom_train import instance_custom_training

train_maskrcnn = instance_custom_training()

train_maskrcnn.modelConfig(network_backbone = "resnet101", num_classes= 2, batch_size = 1)
train_maskrcnn.load_pretrained_model("C:\\Users\Mark Vincent\Desktop/final resnet101/mask_rcnn_coco.h5")
train_maskrcnn.load_dataset("C:\\Users\Mark Vincent\Desktop/final resnet101/skin")
train_maskrcnn.train_model(num_epochs =50,augmentation=True ,path_trained_models = "mask_rcnn_models"    )
```

2. Training Results

Training result.xlsx

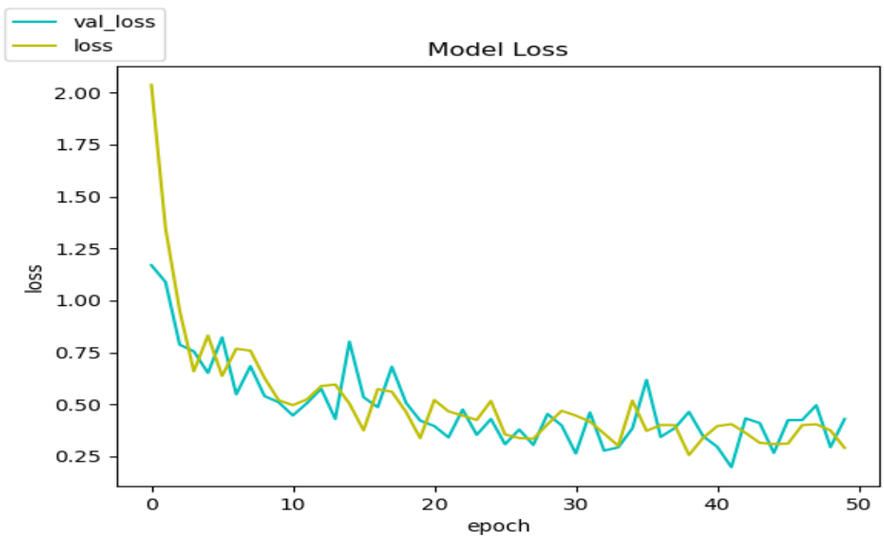
Insert Table of Training Results here.

https://docs.google.com/spreadsheets/d/1ZuZ43m7W063eSrvd6zmYziduhOXoL3Z4/edit?usp=sharing&ouid=111875806191200447127&rtpof=true&sd=true

Provide a brief description of the results

For our model training, we used resnet101 as the network backbone and a pre-trained model mask_rcnn_coco.h5 provided by our instructor. Here we have two classes, the normal and skin cancer. We only trained 50 epochs and as a result, it generate 50 models and we are able to acquired 5 models that hit the target score of 90 % in evaluation. For our model loss, we started on 2.038 loss and ended on 0.297 loss while for val_loss, we started with a 1.1699 val_loss and stop with 0.4298 val_loss.

Insert Chart of Training results here



Provide a brief description of the results

The graph shows the correlation between the Model Loss and the Validation Loss. As you can see, the validation loss and the model loss are intersecting to each other. This means that the training of our model is a good fit.

V. EVALUATION

1. Evaluation Code

```
import pixellib
from pixellib.custom_train import instance_custom_training


train_maskrcnn = instance_custom_training()
train_maskrcnn.modelConfig(network_backbone = "resnet101", num_classes= 2)
train_maskrcnn.load_dataset("<insert dataset directory>")
train_maskrcnn.evaluate_model("<insert model files directory>")
```

2. Evaluation Results

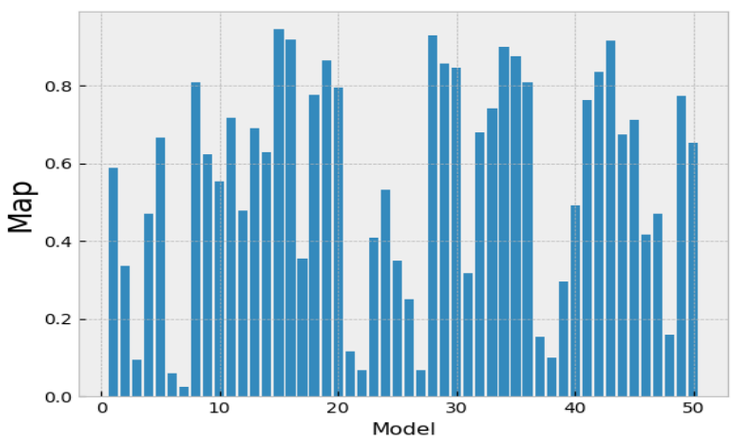
Evaluation Result.xlsx

Insert Table of Evaluation Results here.

https://docs.google.com/spreadsheets/d/1T_-ttTLDAwqypzCd3L3Tf38MMvqCo7Dl/edit?usp=sharing&ouid=111875806191200447127&rtpof=true&sd=true

It shows the model and the MaP value. We use 50 epochs to show more accurate evaluation result. The highest MaP value we get is 94%.

Insert Chart of Evaluation Results here.

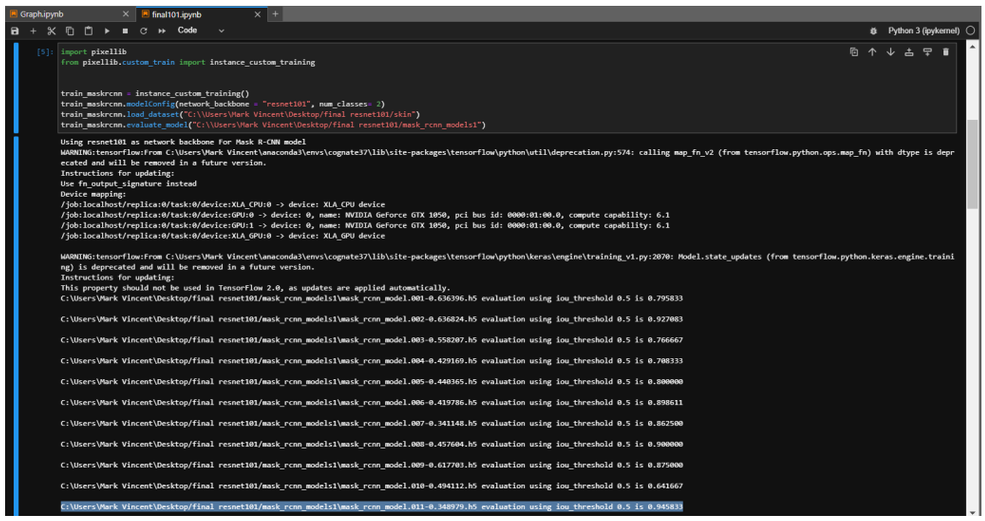


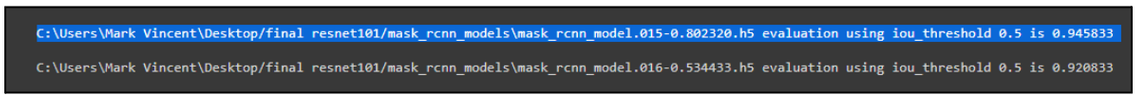
Provide a brief description of the results

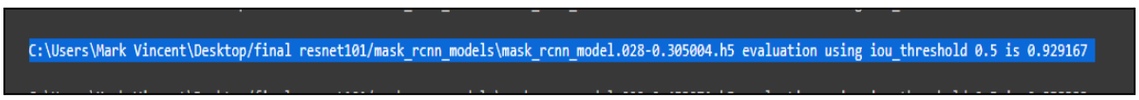
As you can see in the chart of our model evaluation result, some models are able to reach the target of 0.9 or 90% mAp. Out of 50 epochs, we are able to get five models having a 90 percent evaluation

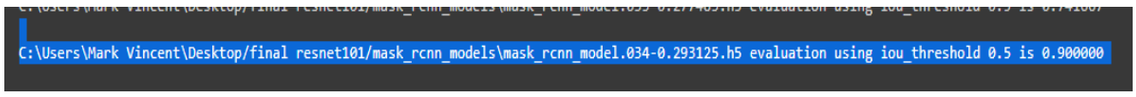
3. **Target performance in terms of the mAP value.** **Target Score: 90% and Above.**

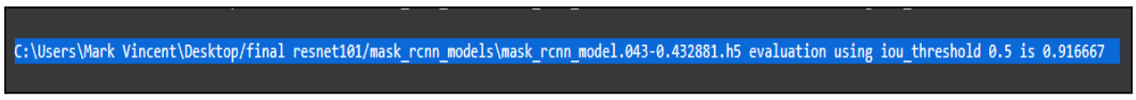
Show the Model with 90% mAP above here.











The picture above show the Map Value we get from the model training. We used 50 epochs in this model training. The highest Map value we get is 94% which exceeds the required MaP value..

RUBRICS FOR GRADING

CRITERIA	Does Not Meet Standards (5 Points)	Partially Meets Standards (4 Points)	Meets Standards (3 – 2 Points)	Exceeds Standards (1 – 0 Points)	SCORE
PROBLEM STATEMENT	The problem is clearly and objectively identified with concise language and defined with consistent precision of detail.	The problem is clearly and objectively identified with concise language and defined with some precision of detail.	The problem is clearly and objectively identified and defined; some detail may be imprecise (general) or unelaborated.	The identification and/or definition of the problem are unclear and/or clearly subjective.	

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DATASET DESCRIPTION	Obtains informed consent from data providers. Offers compensation to content creators when appropriate.	Relies on sources in the public domain and licenses.	Scrapes the web for publicly visible data, relying on Fair Use carve-outs in copyright law in the relevant geographies.	Violates copyright law in the relevant geographies. Does not comply with privacy laws.	
ANNOTATION	Insightful annotations with many connections made beyond the image; outstanding effort.	Some annotations show understanding of the image; sufficient effort.	Many annotations show confusion; little effort.	Most margin annotations show confusion or inaccuracies; very little effort.	
TRAINING	The model was trained completely with optimized parameters (e.g. epoch, batch size, learning rate, etc.).	The model was trained with adjusted parameters (e.g. epoch, batch size, learning rate, etc.)..	The model was trained using standard parameters.	The model was not trained.	
EVALUATION	Correctly evaluated categories with high accuracy and the consequent interpretation with respect to the model.	Correctly evaluated categories with high accuracy and the consequent interpretation with respect to the model.	Correctly evaluated categories with high accuracy and the consequent interpretation with respect to the model.	Correctly evaluated categories with high accuracy and the consequent interpretation with respect to the model.	
TOTAL SCORE	**(Total Score / 25) * 100%**				
COMMENTS/SUGGESTIONS:					

Prepared by:

Dr. Alvin S. Alon
Head, Digital Transformation Center

Engr. Helcy D. Alon
Guest Lecturer I

Submitted by:

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Gallemit, Mark Vincent R.