

Jordan Archaeological sites

Image Classification for Archaeological Sites



Introduction

Jordan Archaeological sites:

- In the archaeological landscape of Jordan, relics from the Nabataean, Roman, Byzantine, and Islamic periods, offering a captivating glimpse into the diverse civilizations that flourished in this crossroads of the ancient world.

Problem statement:

- The big conflict between the Archaeological sites specially in Jordan.
- Tourism in Jordan.

Start

Data collection

Modeling

Fine tuning

Select best model

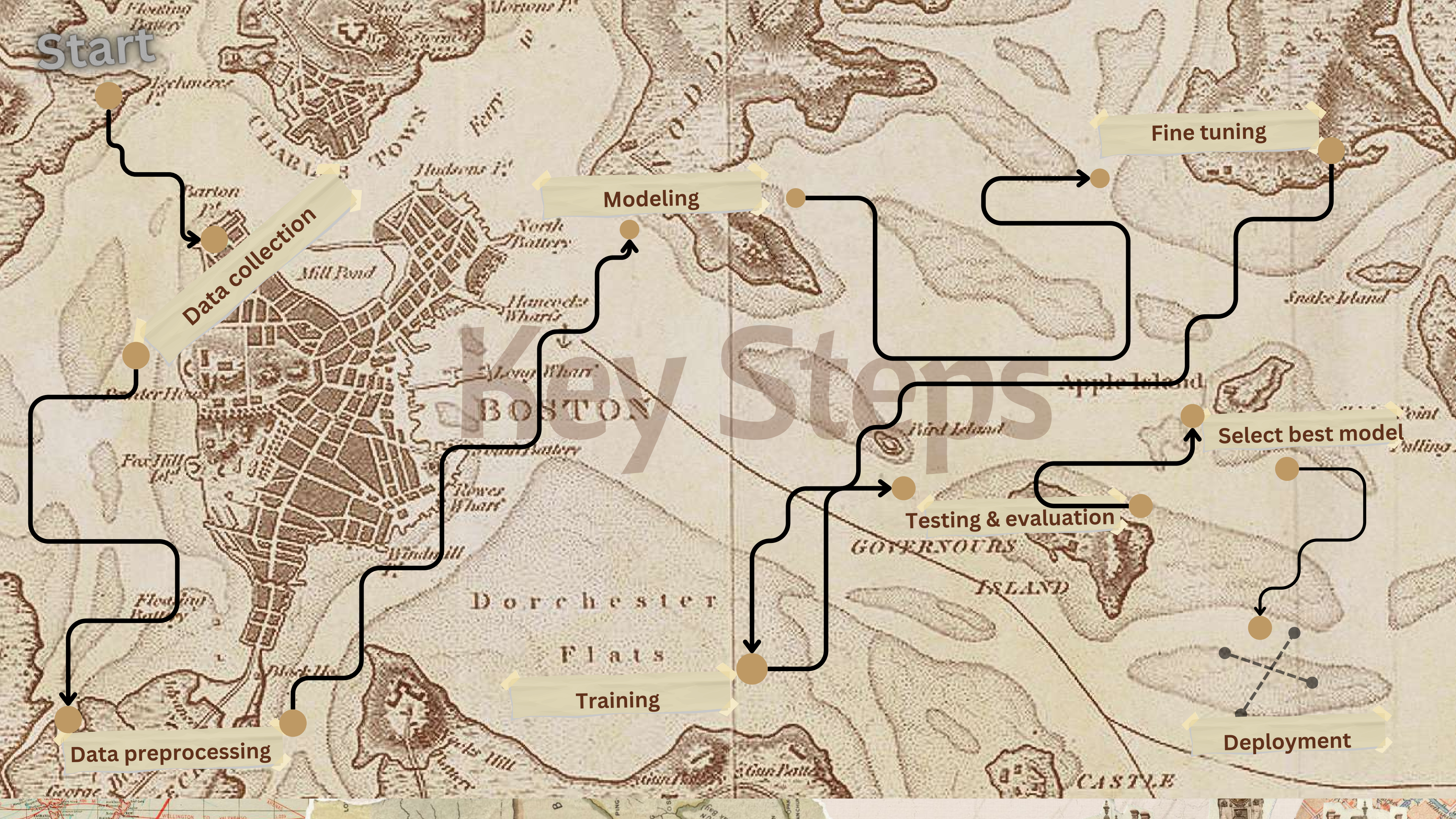
Testing & evaluation

Training

Data preprocessing

Deployment

Key Steps



Data collection

1-Hands collection

2-Browsers extensions

Image Downloader

screenshot youtube video

Go full page screen capture

3-Youtube Videos

Extension to capture
frames

4-Web scraping



I strongly believe that
the moment you decide
better at your chosen
men, you'll become more
more to learn. My journey
our institution failed



Data Preparation

Dataset:

Images of Jordanian landmarks (Ajloun, Jerash, Petra, Roman Amphitheater, Umm Qais, Wadi Rum).

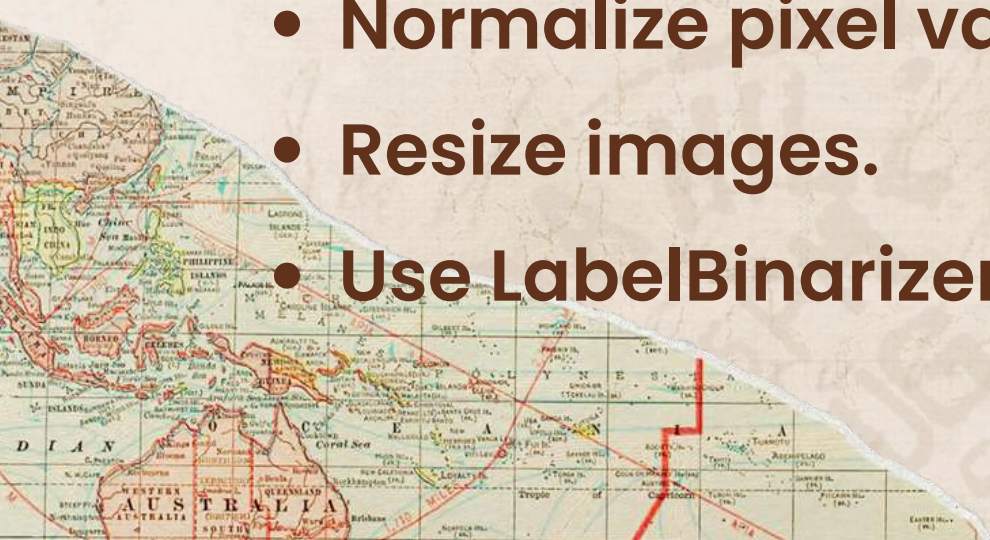
Total: 4418

Training: 3725

Test: 693

Preprocessing:

- Load images and labels using pathlib and glob.
- Normalize pixel values to $[0, 1]$.
- Resize images.
- Use LabelBinarizer to encode class labels.





Model Architecture

Base Model:

- InceptionV3 – Image size (299,299,3)
- Efficientnet B7 – Image size (600,600,3)
- ResNet50 – Image size (299,299,3)
- VGGNet16 – Image size (224,224,3)

with weights pre-trained on ImageNet.


Freezing Layers:

Freeze initial layers for feature extraction.

Customize the network with additional layers for classification.

Architecture:

Global Average Pooling, Dense, ReLU, Batch Normalization, Dropout, Softmax.



Training Phase (1)

Data Augmentation:

ImageDataGenerator for augmentation.

rotation_range=60, horizontal_flip=True, width_shift_range=0.1,
height_shift_range=0.2, shear_range=0.2, zoom_range=0.2

Compile Model:

Categorical Crossentropy loss, Adam optimizer.

Training:

Initial training with frozen layers.



Fine-Tuning Phase



Unfreeze Layers:

- Allow some layers to be trainable.

Compile Model Again:

- Same loss and optimizer with a lower learning rate.

Training:

- Fine-tuning with a focus on specific layers.
- Evaluate on validation set.

Evaluation and Metrics

Model Evaluation:

- Evaluate on the test set.

Metrics:

- Accuracy, Confusion Matrix, Classification Report.

Efficientnet

Best model with accuracy 83.4

As a best trial: **precision: 0.86**

recall : 0.85

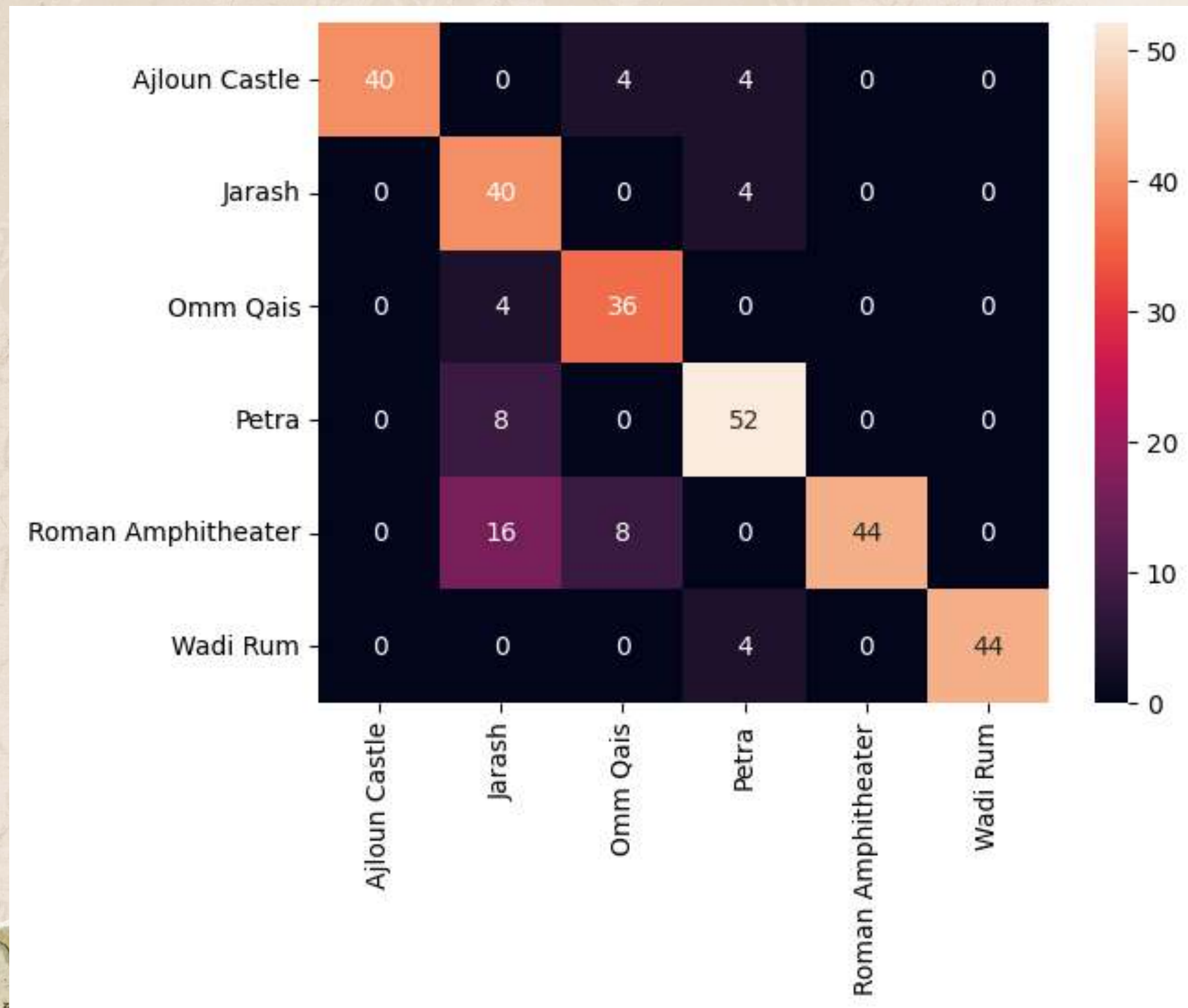
f1-score : 0.84

Total params: 105879698

Trainable params: 47116701

Non-trainable params: 58762997

Image Size: (255,255,3)

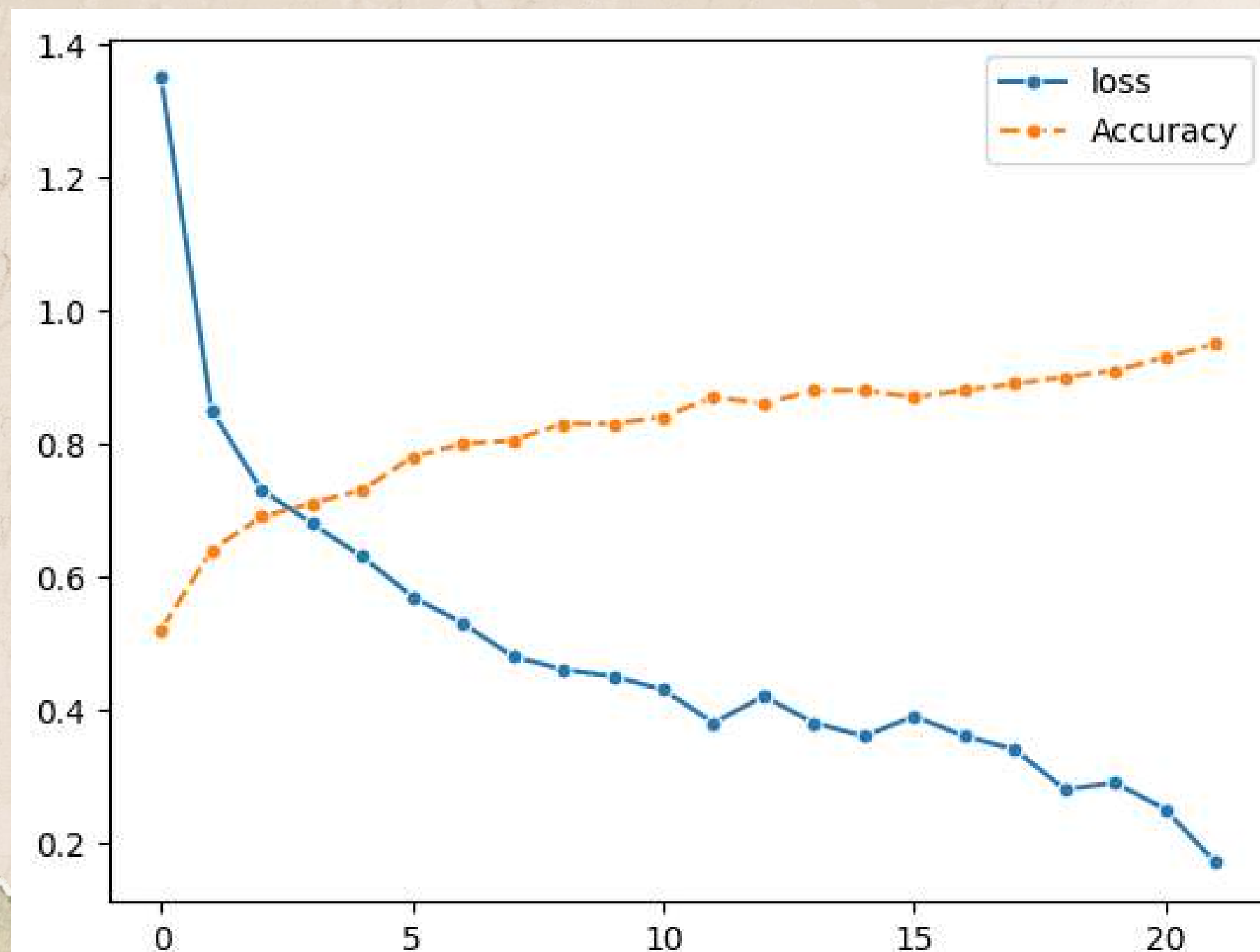


Efficientnet con.

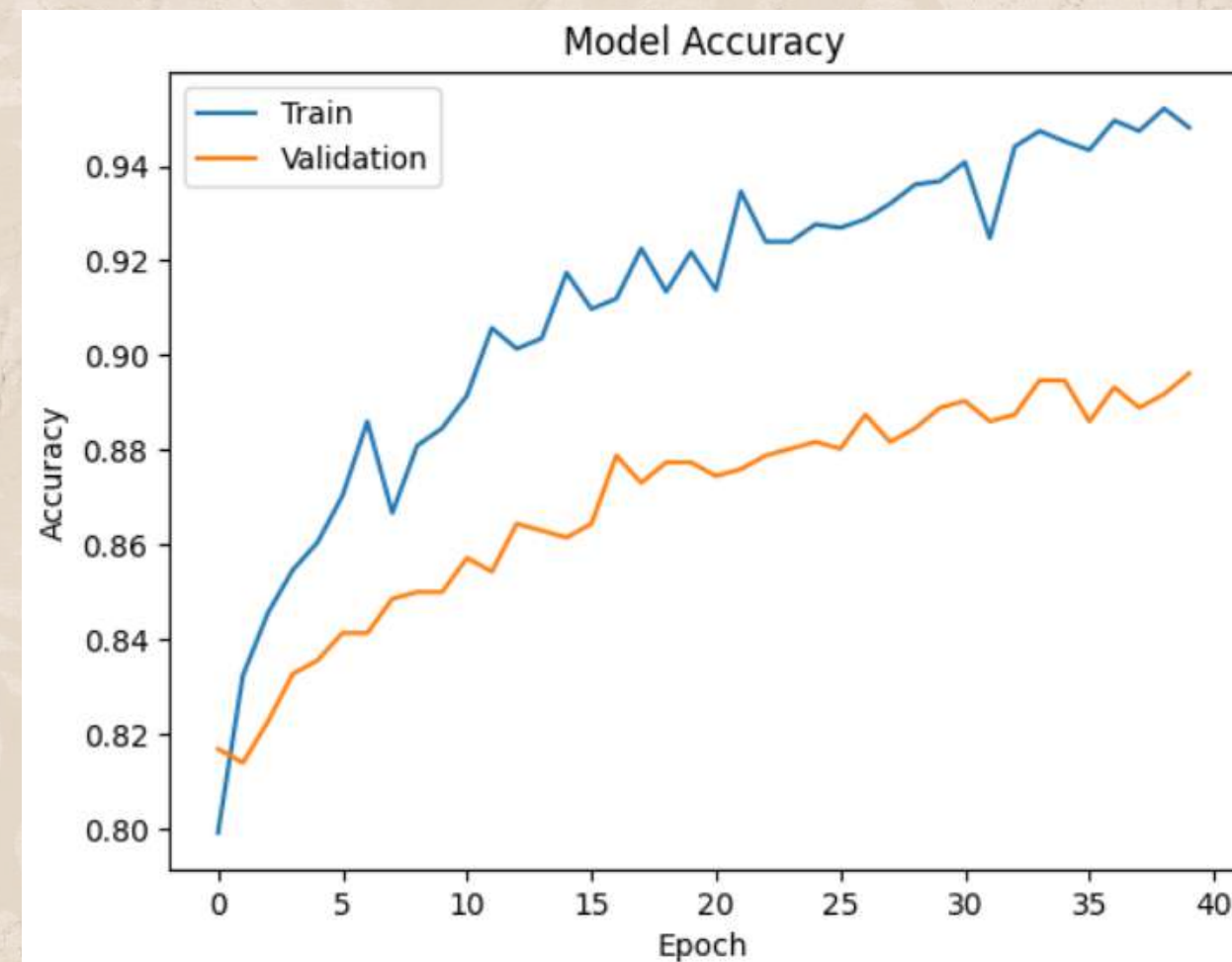
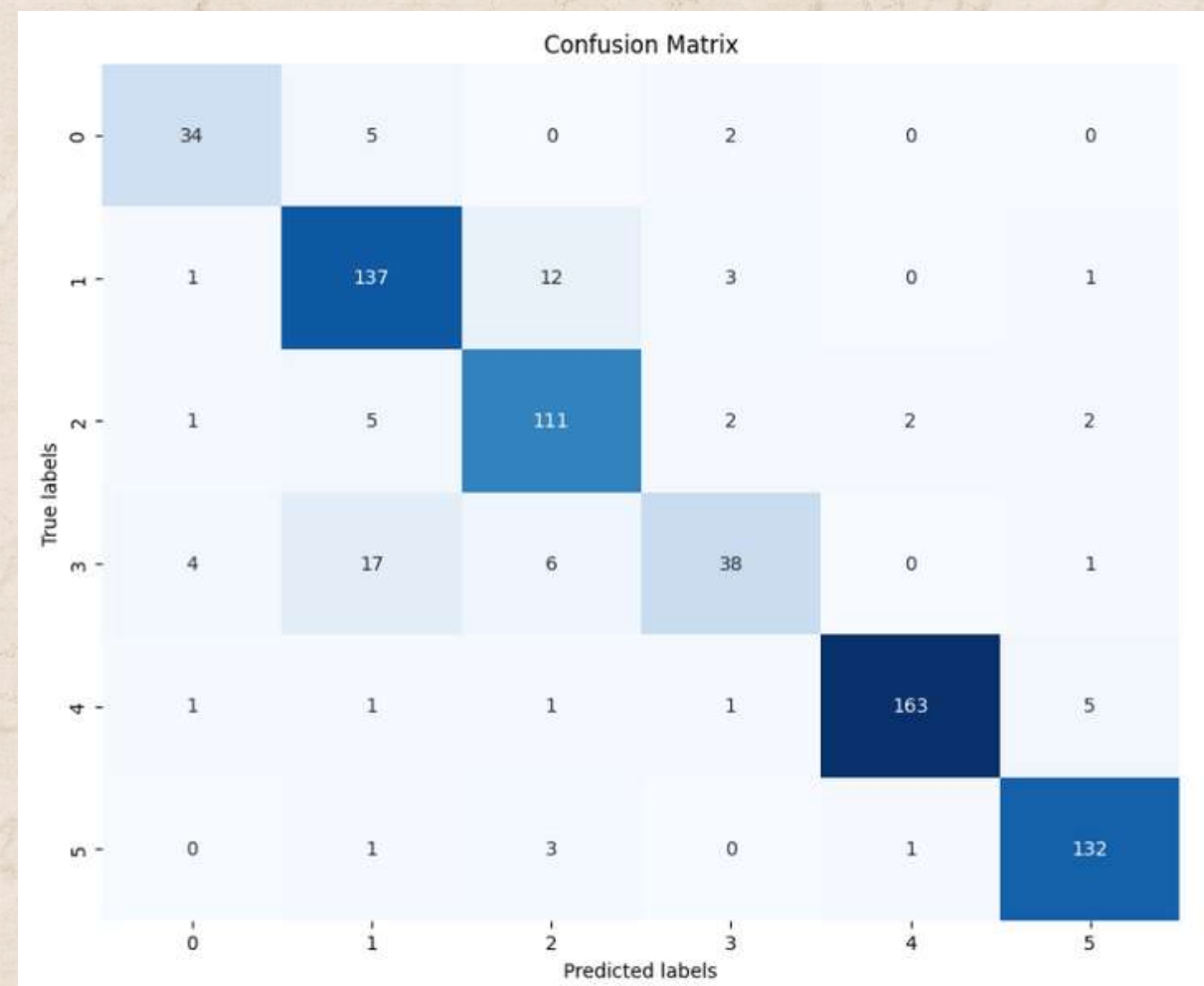
Unfreeze Last 4 Conv layers

Add dense layer with 255 neurons

	precision	recall	f1-score	support
Ajloun Castle	1.00	0.83	0.91	12
Jarash	0.59	0.91	0.71	11
Omm Qais	0.75	0.90	0.82	10
Petra	0.81	0.87	0.84	15
Roman Amphitheater	1.00	0.65	0.79	17
Wadi Rum	1.00	0.92	0.96	12
accuracy			0.83	77
macro avg	0.86	0.85	0.84	77
weighted avg	0.87	0.83	0.84	77



InceptionV3

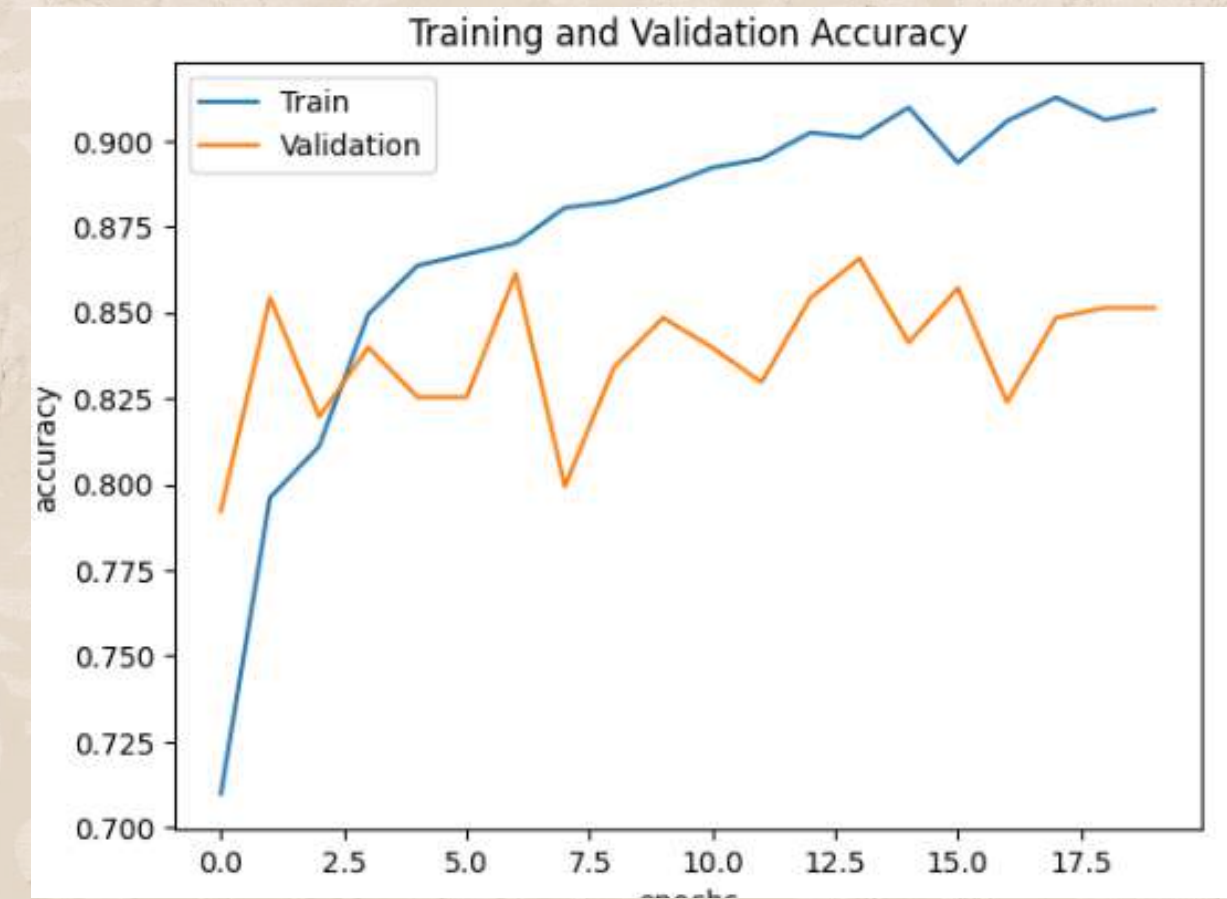
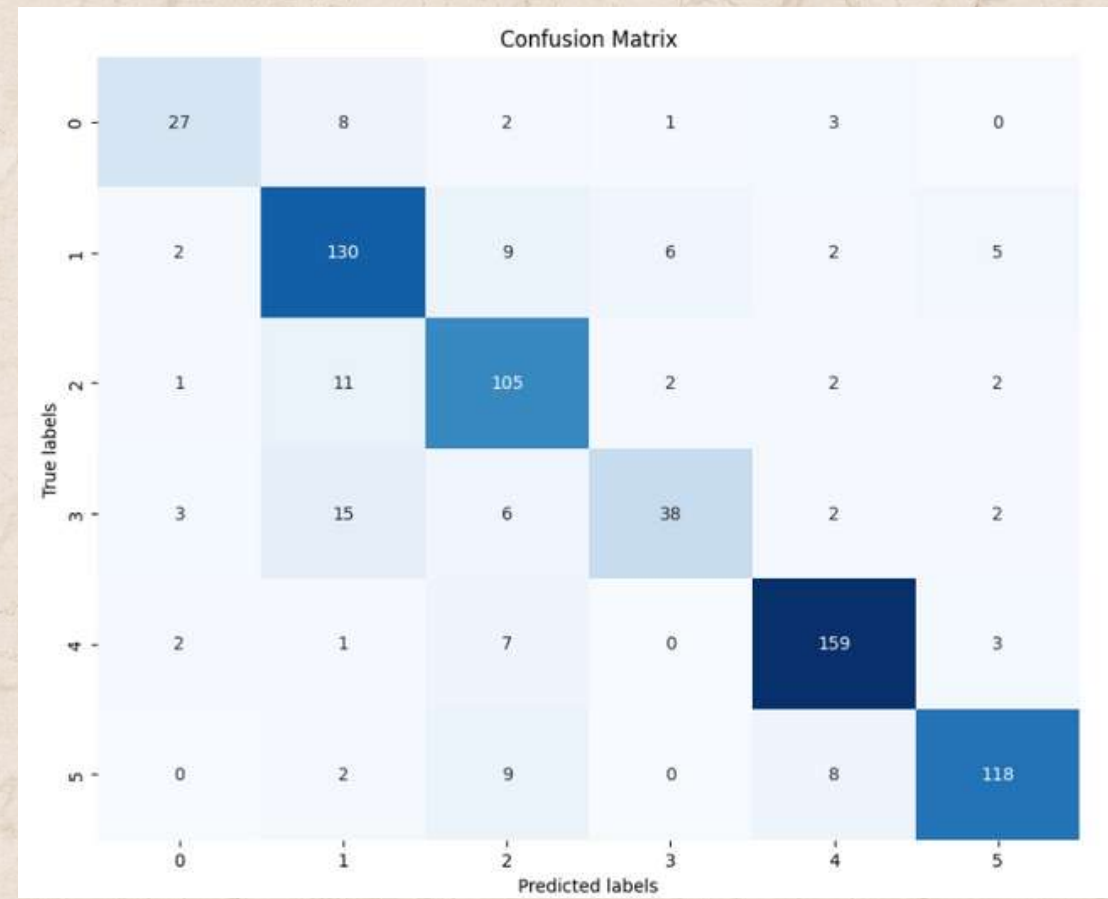


Classification Report:

	precision	recall	f1-score	support
Ajloun	0.83	0.83	0.83	41
Jerash	0.83	0.89	0.86	154
Petra	0.83	0.90	0.87	123
RomanAmphitheater	0.83	0.58	0.68	66
UmmQais	0.98	0.95	0.96	172
WadiRum	0.94	0.96	0.95	137
accuracy			0.89	693
macro avg	0.87	0.85	0.86	693
weighted avg	0.89	0.89	0.89	693



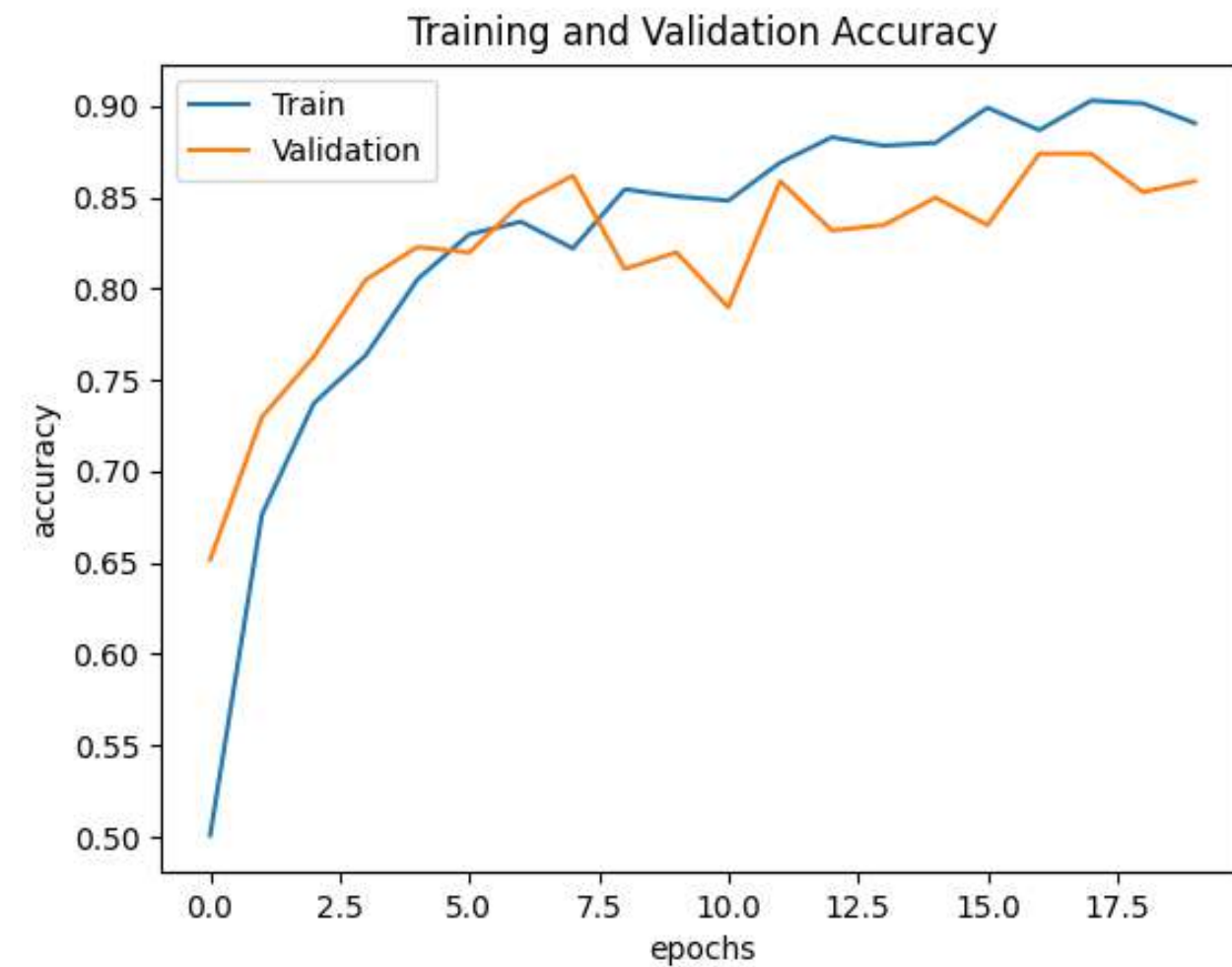
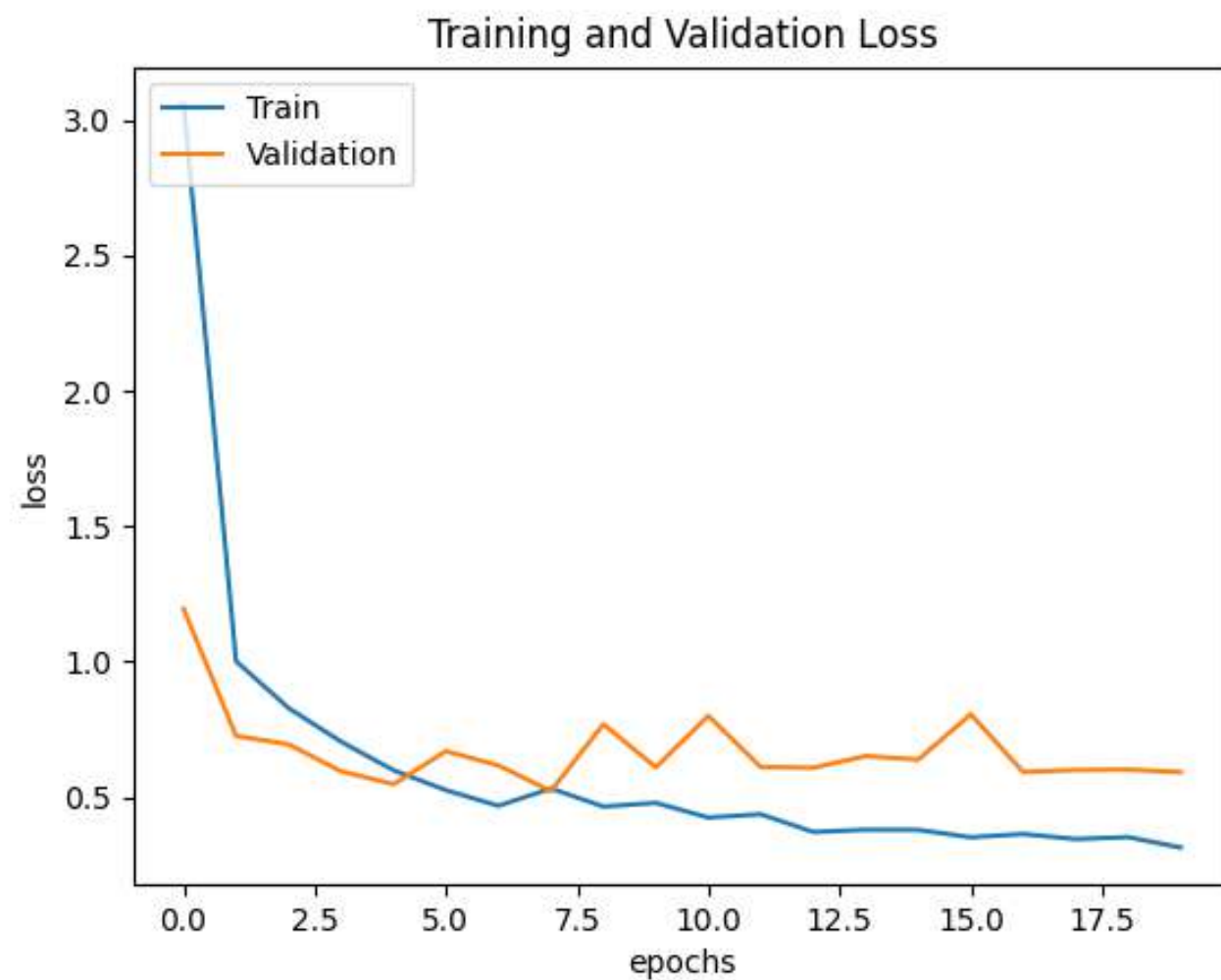
VGGNet



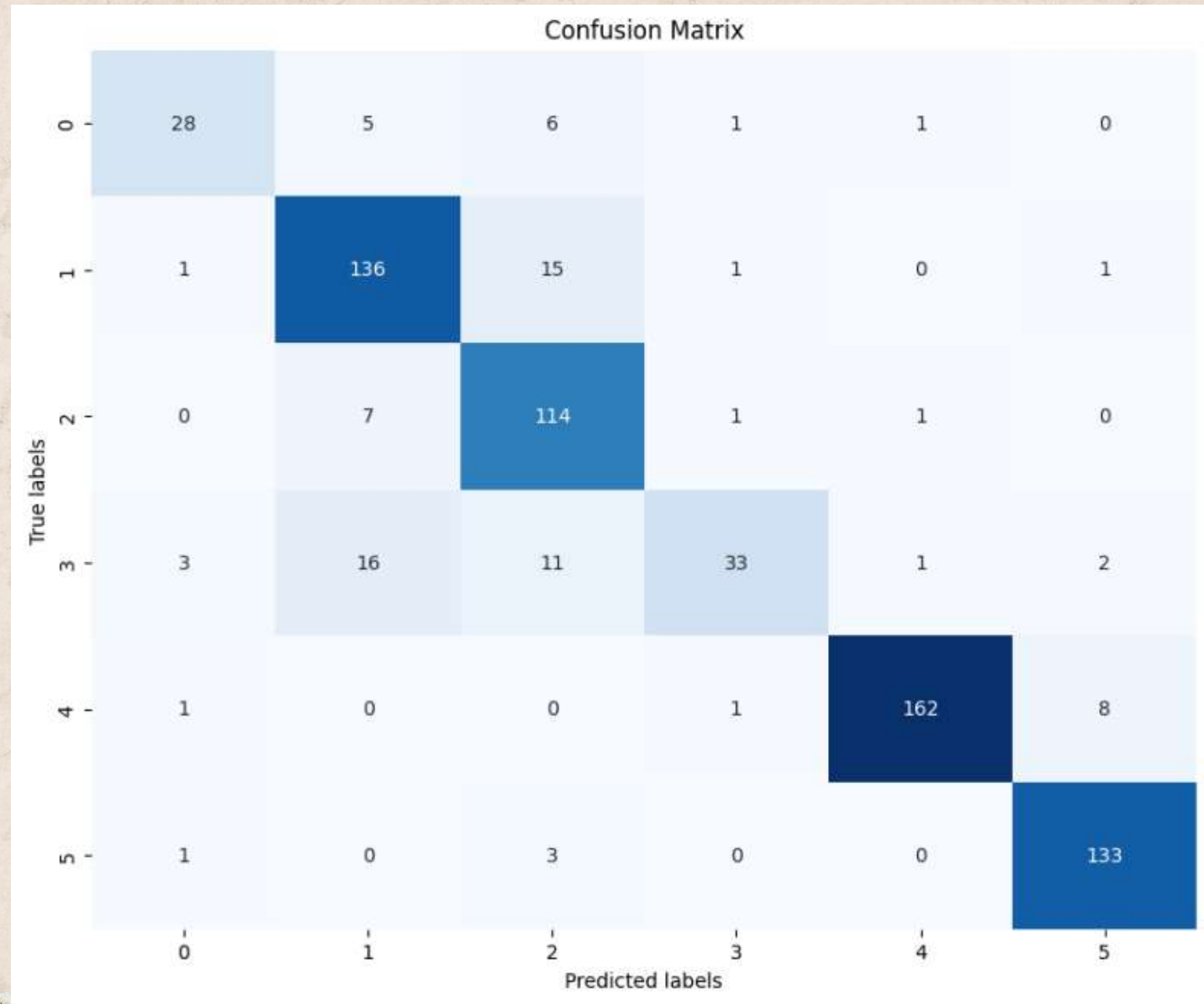
Classification Report:

	precision	recall	f1-score	support
Ajloun	0.77	0.66	0.71	41
Jerash	0.78	0.84	0.81	154
Petra	0.76	0.85	0.80	123
RomanAmphitheater	0.81	0.58	0.67	66
UmmQais	0.90	0.92	0.91	172
WadiRum	0.91	0.86	0.88	137
accuracy			0.83	693
macro avg	0.82	0.79	0.80	693
weighted avg	0.83	0.83	0.83	693

ResNet



ResNet



11/11 [=====] - 2s 54ms/step

Classification Report:

	precision	recall	f1-score	support
Ajloun	0.84	0.93	0.88	40
Jerash	0.83	0.81	0.82	47
Petra	0.87	0.92	0.90	51
RomanAmphitheater	0.79	0.97	0.87	66
UmmQais	0.94	0.69	0.80	68
WadiRum	0.95	0.90	0.92	61
accuracy			0.86	333
macro avg	0.87	0.87	0.86	333
weighted avg	0.87	0.86	0.86	333

Conclusions

	Precision	Recall	F1-score	Accuracy
Efficientnet	0.86	0.85	0.84	0.83
VGGnet	0.82	0.79	0.80	0.83
ResNet	0.89	0.87	0.86	0.87
InceptionV3	0.87	0.85	0.86	0.89



Resources

<https://www.visitpetra.jo/Pages/viewpage.aspx?pageID=186>

<https://github.com/hasanoqool/ImageClassification-PretrainedModel>

<https://www.istockphoto.com/search/2/image-film?excludenudity=true&phrase=petra%20jordan&page=2>

<https://www.gettyimages.ae/photos/petra-jordan>

<https://unsplash.com/s/photos/petra>

<https://www.shutterstock.com/search/petra>

<https://www.istockphoto.com/search/2/image-film?phrase=ajloun+castle>







<https://www.google.com/search?>

[q=ajloun+castle+images&rlz=1C5CHFA_enJO1079JO1080&sourceid=chrome&ie=UTF-8](https://www.google.com/search?q=ajloun+castle+images&rlz=1C5CHFA_enJO1079JO1080&sourceid=chrome&ie=UTF-8)

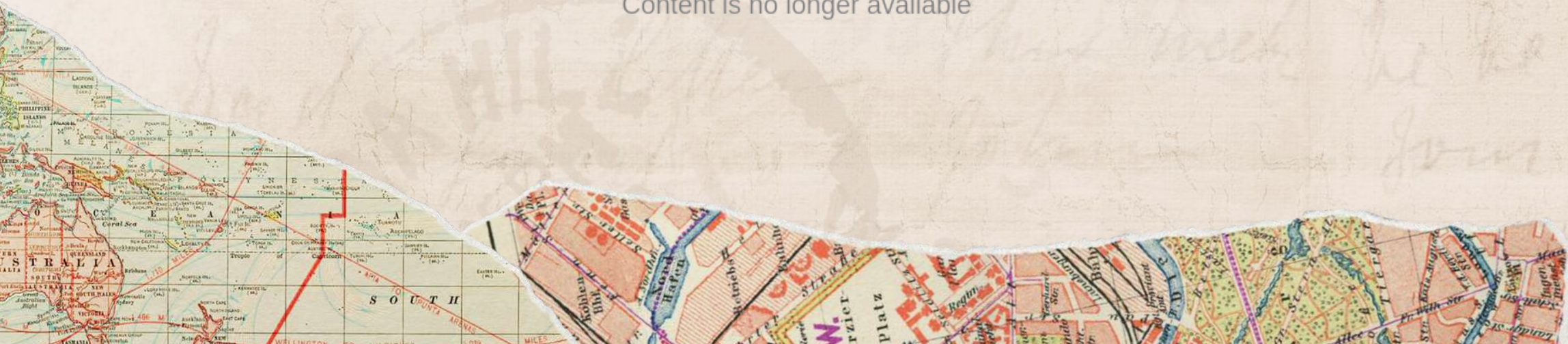
<https://www.alamy.com/stock-photo/ajloun-castle.html?sortBy=relevant>

<https://www.gettyimages.com/photos/ajloun-castle>

Demo

TITLE	LAST MODIFIED
 Ajloun Castle	Jan 29
 Jarash	Jan 29
 Omm Qais	Jan 29
 Petra	Jan 29
 Roman Amphitheater	Jan 29
 Wadi Rum	Jan 29

Content is no longer available





Thank you very much!

Raneem Alomari

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Eng. Khawla Alquran