TRANSFER LEARNING USING MOBILENET FOR RAINBOW IMAGE RECOGNITION

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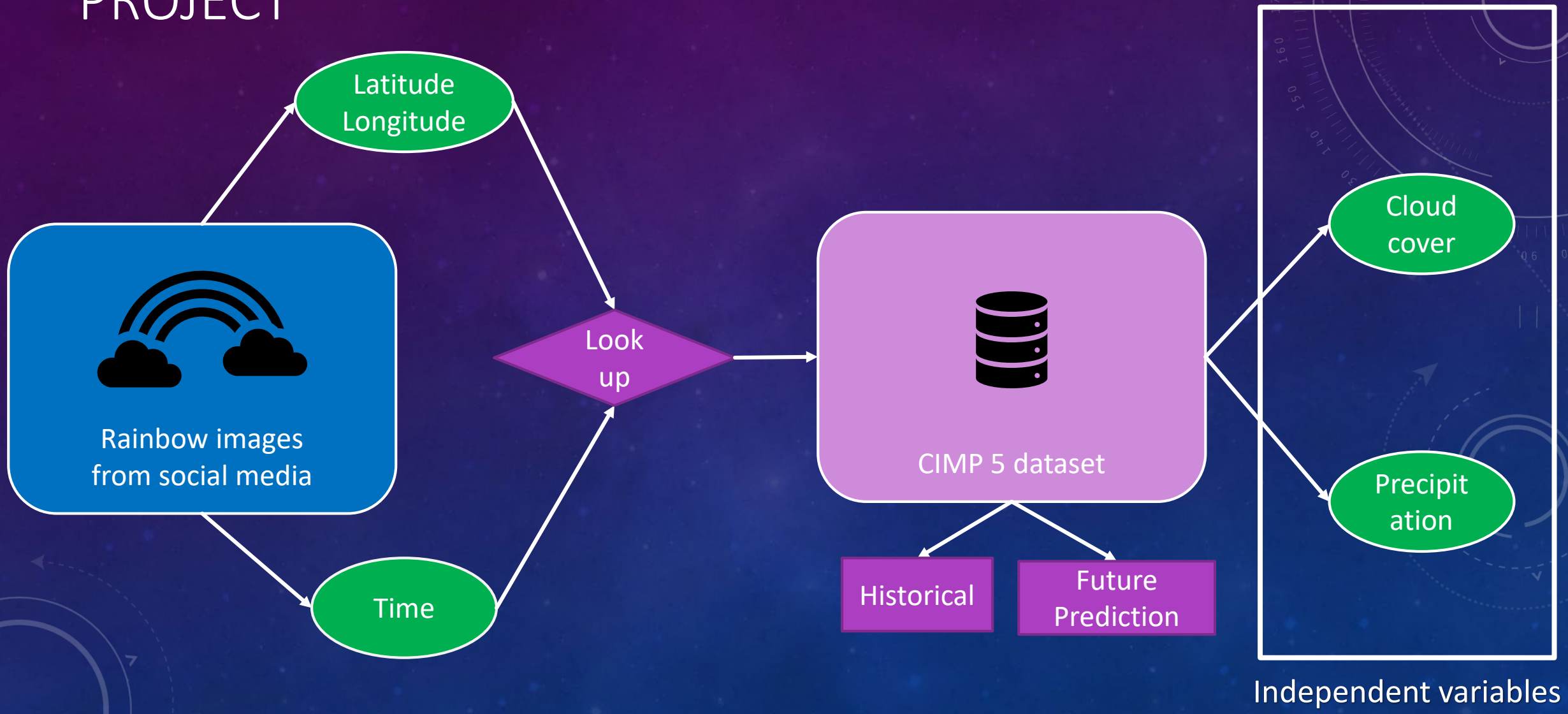
PROJECT


Latitude
Longitude
Rainbow images
from social media
Time
Look
up
CIMP 5 dataset
Historical
Future
Prediction
Cloud
cover
Precipit
ation
Independent variables

DATA

- Social media images (Flickr)
- Geotagged (latitude, longitude)
- Resolution: 500 * 375
- Keywords: ‘rainbow’ [1]
- Training & validation ratio: 80% - 20%
- Manually classified labels (criteria follows)

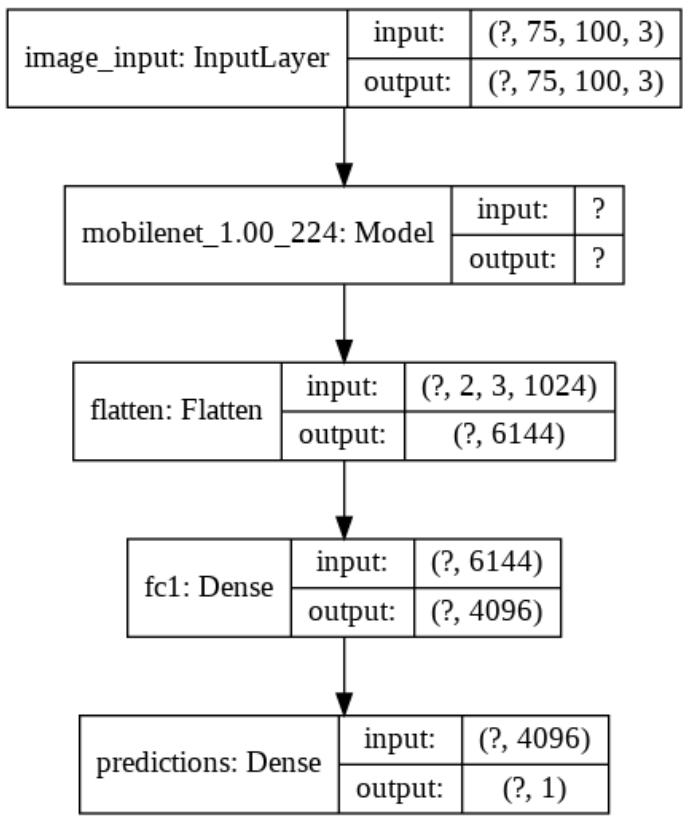
Total	Training set	Validation set
22,135	17,708	4,427

1. https://www.flickr.com/services/api/flickr.photos.search.html

CRITERIA

- Rainbow above horizon
- Not near waterfall
- No fake rainbow
- No altered pictures (must be consistent with real taken time)

IMPLEMENTATION



Layer (type)	Output Shape	Param #
image_input (InputLayer)	(None, 75, 100, 3)	0
mobilenet_1.00_224 (Model)	multiple	3228864
flatten (Flatten)	(None, 6144)	0
fc1 (Dense)	(None, 4096)	25169920
predictions (Dense)	(None, 1)	4097

Total params: 28,402,881
Trainable params: 25,174,017
Non-trainable params: 3,228,864

Layer (type)	Output Shape	Param #
image_input (InputLayer)	(None, 75, 100, 3)	0
mobilenet_1.00_224 (Model)	multiple	3228864
flatten (Flatten)	(None, 6144)	0
fc1 (Dense)	(None, 4096)	25169920
predictions (Dense)	(None, 1)	4097

Total params: 28,402,881
Trainable params: 28,380,993
Non-trainable params: 21,888

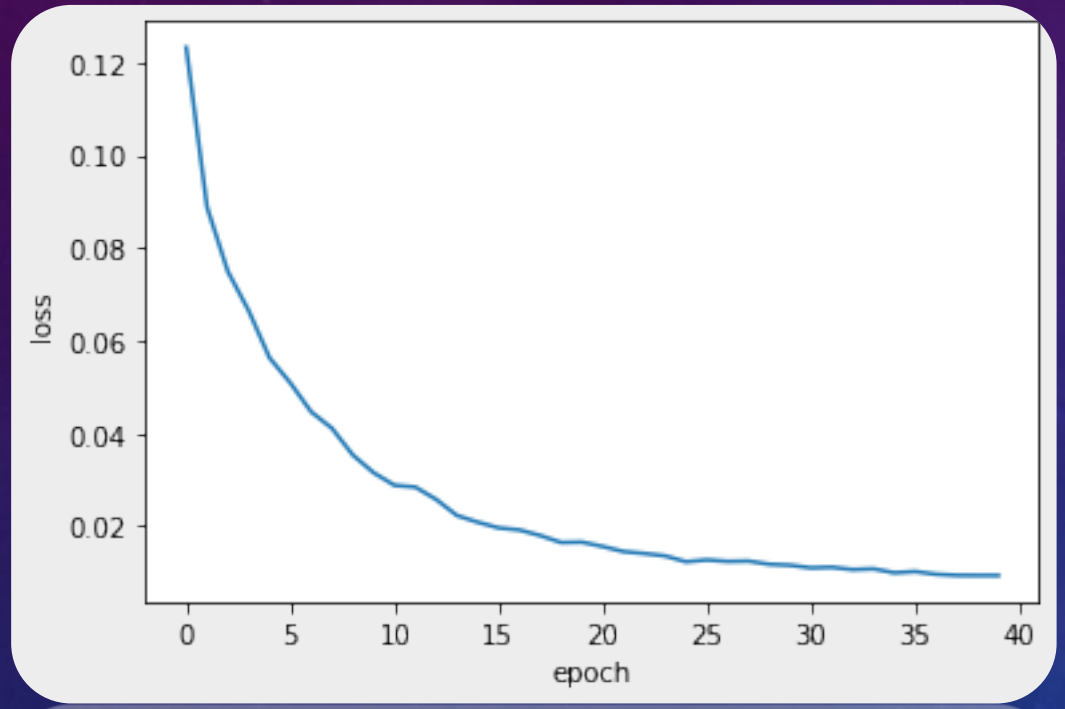
Sigmoid to get value from 0 to 1 in the last layer

IMPLEMENTATION

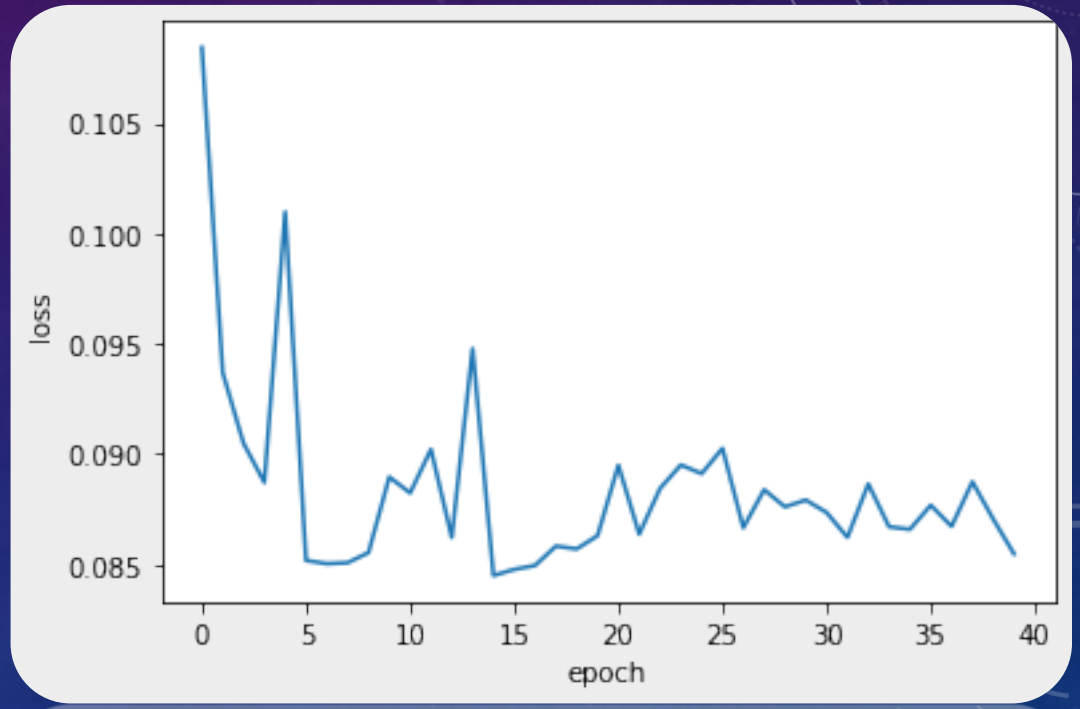
	Time	Epochs	acc	val_acc	loss	val_loss
First run	14 min	40	0.9759	0.7638	0.0224	0.1679
Second run	34 min	40	0.9898	0.8993	0.0094	0.0855

- First run with freezing layers in MobileNet
  - Took 14 min
  - Achieved 76.3% validation accuracy
- Second run with all free layers
  - Took 34 min
  - Achieved 89.93% validation accuracy

IMPLEMENTATION

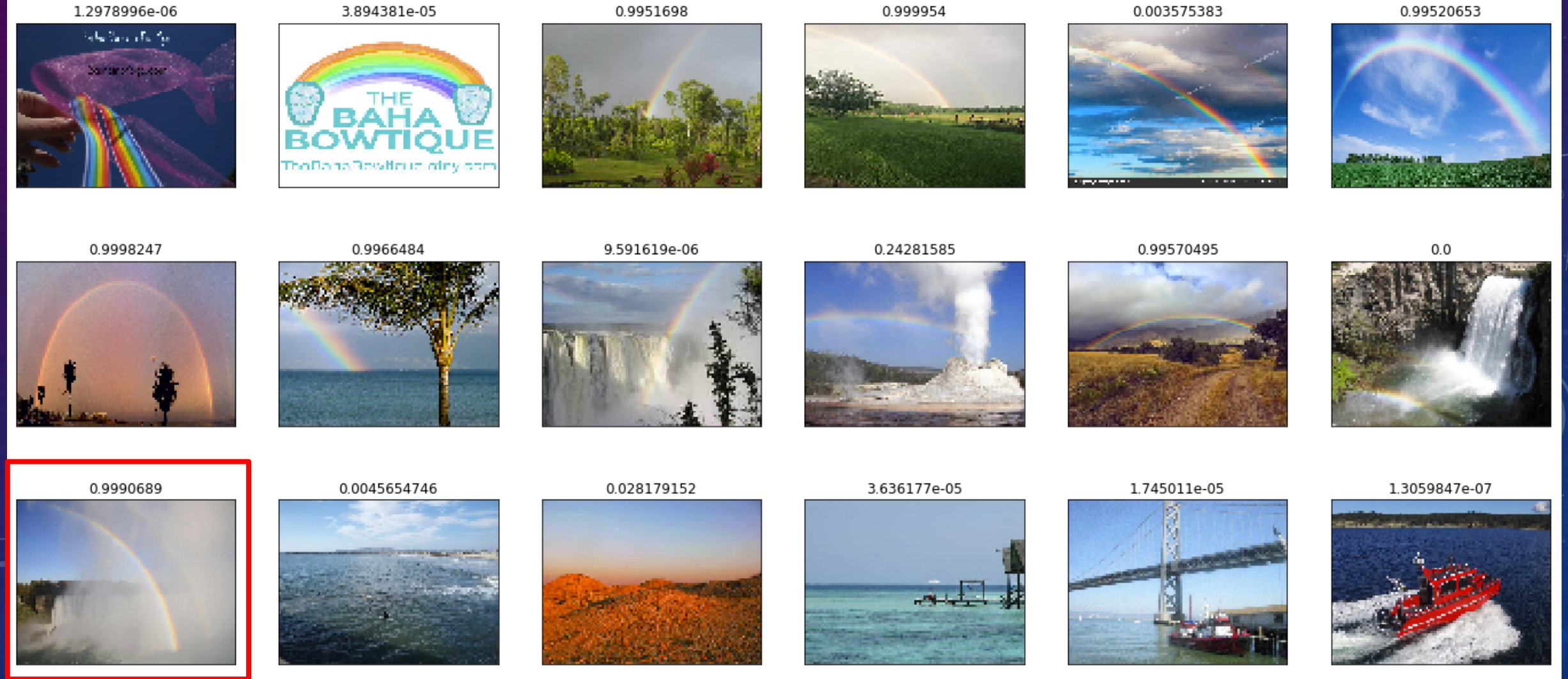


Training



Validation

RESULTS


1.2978996e-06
3.894381e-05
THE
BAHA
BOWTIQUE
0.9951698
0.999954
0.003575383
0.99520653
0.9998247
0.9966484
9.591619e-06
0.24281585
0.99570495
0.0
0.9990689
0.0045654746
0.028179152
3.636177e-05
1.745011e-05
1.3059847e-07

RESULTS

0.16379257
0.98905075
4.0389263e-05
1.584993e-06
0.9998964
4.3343124e-07
0.9894357
0.59721583
0.26177862
0.021224424
0.9999931
5.5818673e-06

RESULTS

- 2 out of 30 random pictures (not included in training/validation set) were wrongly classified
- The trained model can achieve around 90% accuracy in validation set
- Accuracy achieved from the test set is 93.33%

Outcomes of the model	Fact (if is rainbow)	
	Positive	Negative
Positive	10 (TP)	2(FP)
Negative	0(FN)	18(TN)

SHORTCOMINGS AND FUTURE STEPS

- Limited resolution for processing
- Potential errors in manually classified labels
- Imperfect optimizer

- Set up mobile applications
- Add more pictures for training
- Seek better optimizer
- Apply this framework for other projects which need image recognition

DATA AVAILABILITY

- Preprocessing image data:
- https://colab.research.google.com/drive/17Uu_aRY_KgZDp7PK6m1fWdcp9OpYs6rs
- Training model and prediction:
- https://colab.research.google.com/drive/1EueUHKScuaZu7FvfO2HVZDs-pOd7Vvl-

QUESTIONS?

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