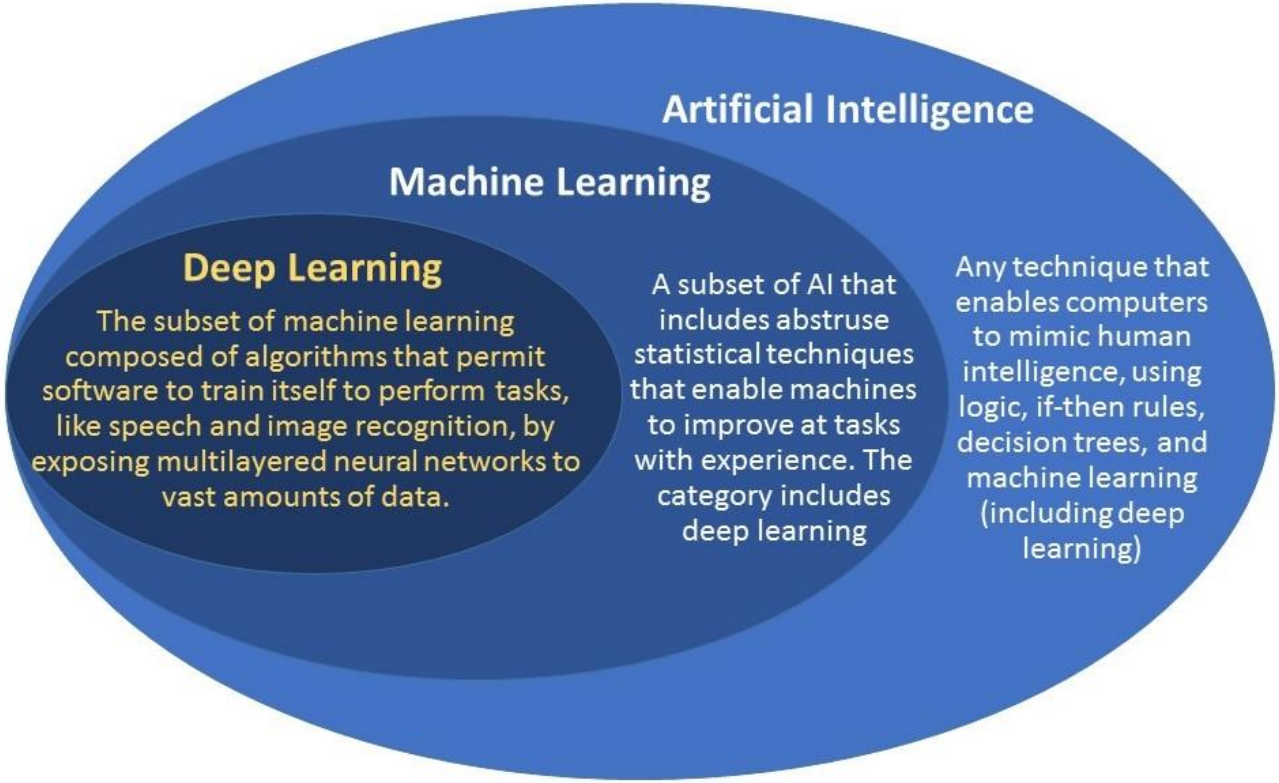
try! Swift

AI & Deep Learning using Core ML and Metal Framework

By:
Akanksha Sharma
Twitter : @akanksharmaa

AI v/s Machine Learning v/s Deep Learning



Problem Statement / About the app

Manually editing videos is very skill oriented task and time consuming

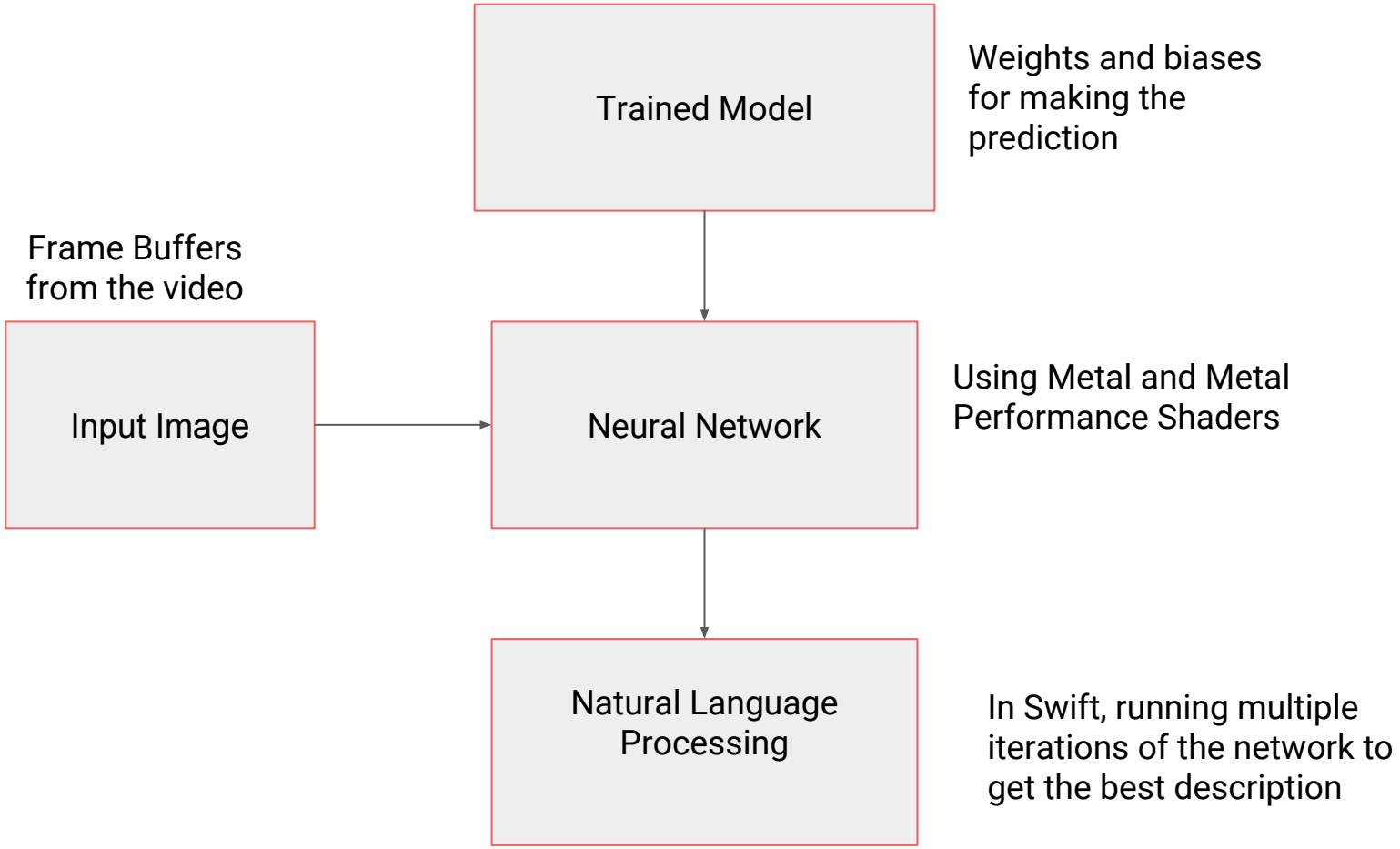
Creates stunning video stories. Automatically.

Powered by

NEXGEAR

We added Intelligence in our app.

App Demo


Trained Model
Weights and biases for making the prediction
Frame Buffers from the video
Input Image
Neural Network
Using Metal and Metal Performance Shaders
Natural Language Processing
In Swift, running multiple iterations of the network to get the best description

We built a Hybrid Model which contained some more layers over the Inception model to increase accuracy.

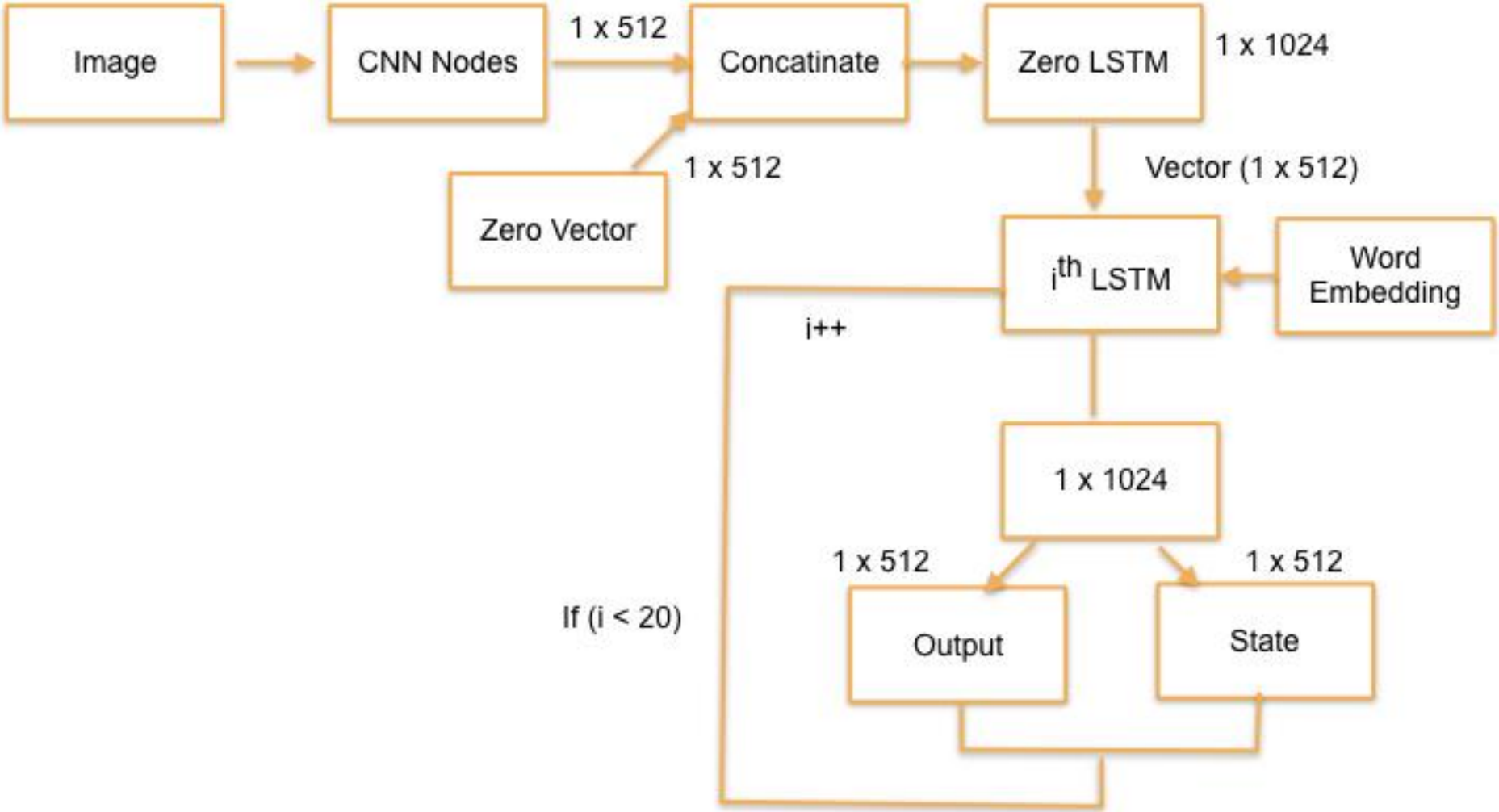


Image
CNN Nodes
1 x 512
Concatinate
Zero LSTM
1 x 1024
Zero Vector
1 x 512
Vector (1 x 512)
i^th LSTM
Word Embedding
i++
1 x 1024
1 x 512
1 x 512
If (i < 20)
Output
State

Input Image

- Using Realm DB, iterate over each frame of the video.
- Resize the CGImage

Trained Model

Our model was trained on Tensorflow, and we used the model weights to pre initialize in the architecture which we built for Metal framework.

Tools Used

- Training on GPU servers, Inference on iOS
- Metal Kit

  Developing Neural Networks

  Image Processing

  Matrix Multiplication

- Shaders Language

In Metal 2, MPS expands its machine learning capabilities to enable new classes of algorithms, such as natural language processing, to execute on the GPU.

Convolutional Network

24 convolutional layers

10 Max pooling layers (Sampling)

2 Fully connected

1 Embedding layer

Recurrent Neural Network

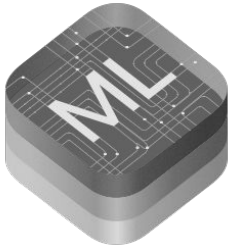
2 LSTM layers

1 Softmax layer

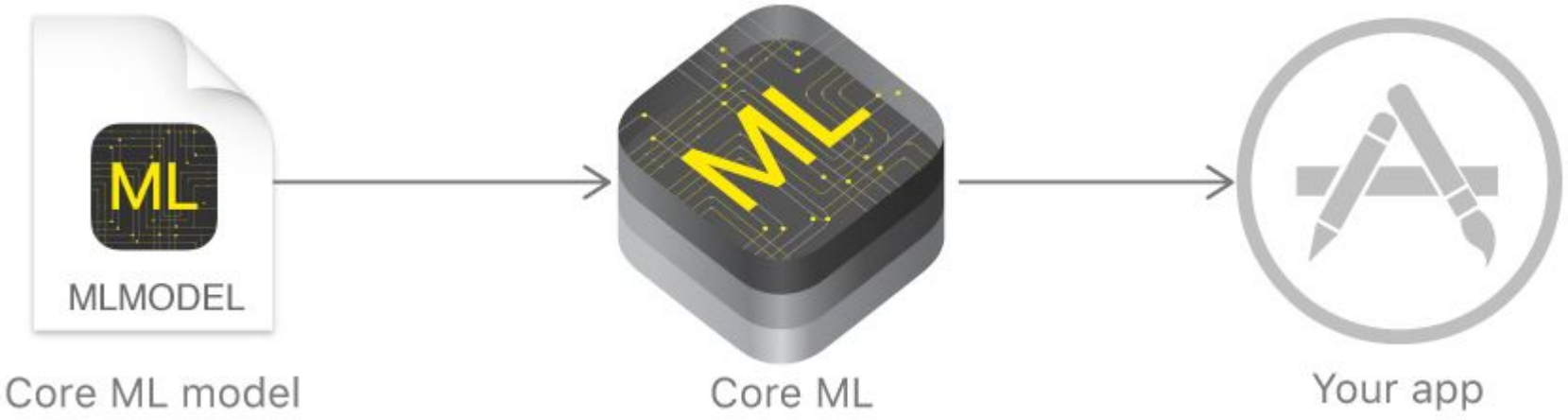
iOS

Couple of months back, in latest update of IOS

Apple released CoreML Library, which does the same, we did few months back.



Core ML



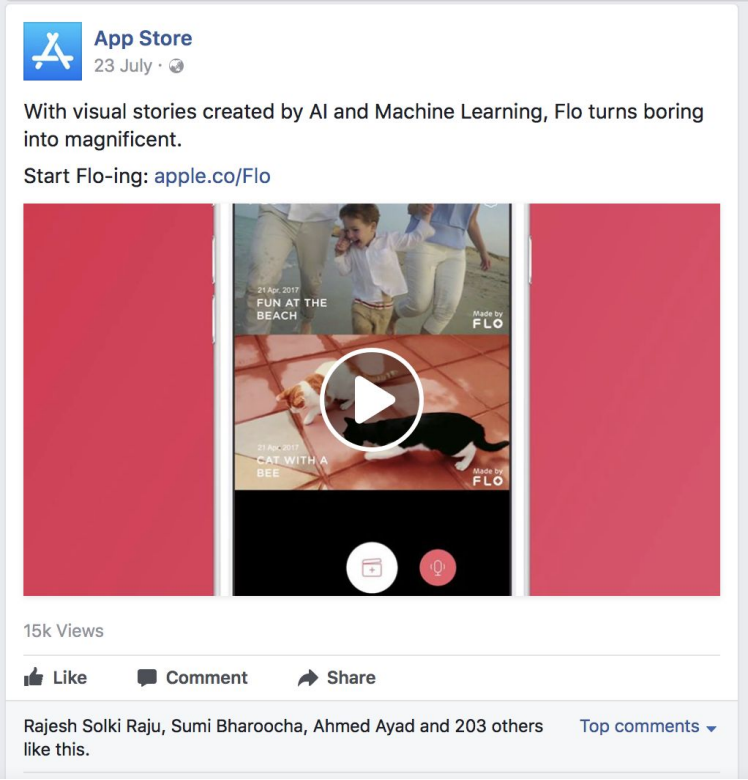
Challenges faced earlier

- GPU Time out
- Variable sharing across multiple cores
- Debugging of big matrix multiplications and the actual output

Core ML and Metal 2 can be a great help in resolving them.

Core ML is optimized for **on-device performance**, which minimizes **memory footprint and power consumption.**

When Apple talks about your app, you did something good.



So in the end,
You can download Flo from App Store

Flo - Intelligent Camera & AI Movie Maker
https://itunes.apple.com/in/app/flo-intelligent-camera-ai-movie-maker/id1148937759?mt=8

Thanks