HUMAN RECOGNITION ACTIVITY

Trung Ngo –
Coderschool MLE 08/2021

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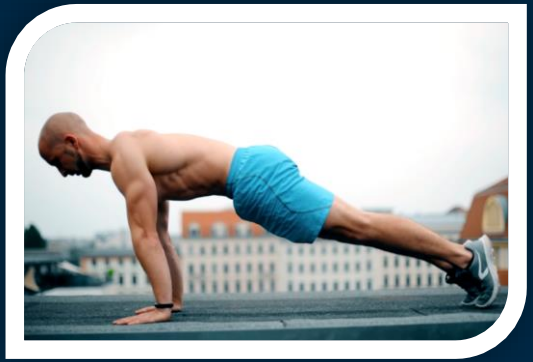
Understanding Human Activity Recognition

A person doing a backflip

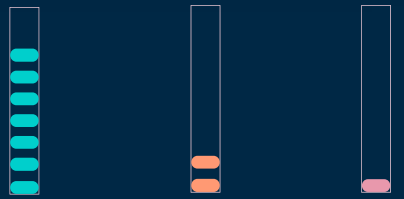
An extracted frame – model predicts image as falling

HAR – Prediction based on data in sequences

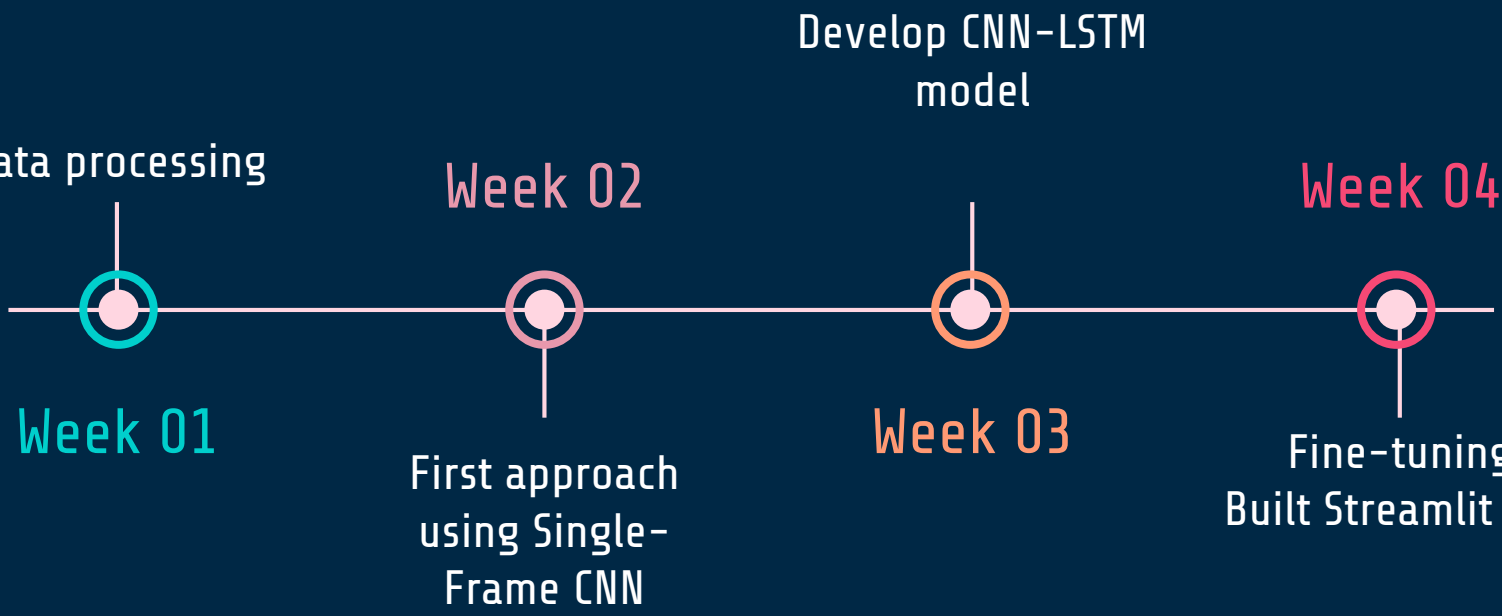
Seen action (Input)



Unseen action (Output)



My journey


Data processing
Week 01
Week 02
First approach using Single-Frame CNN
Develop CNN-LSTM model
Week 03
Week 04
Fine-tuning
Built Streamlit app

(8 subclasses)

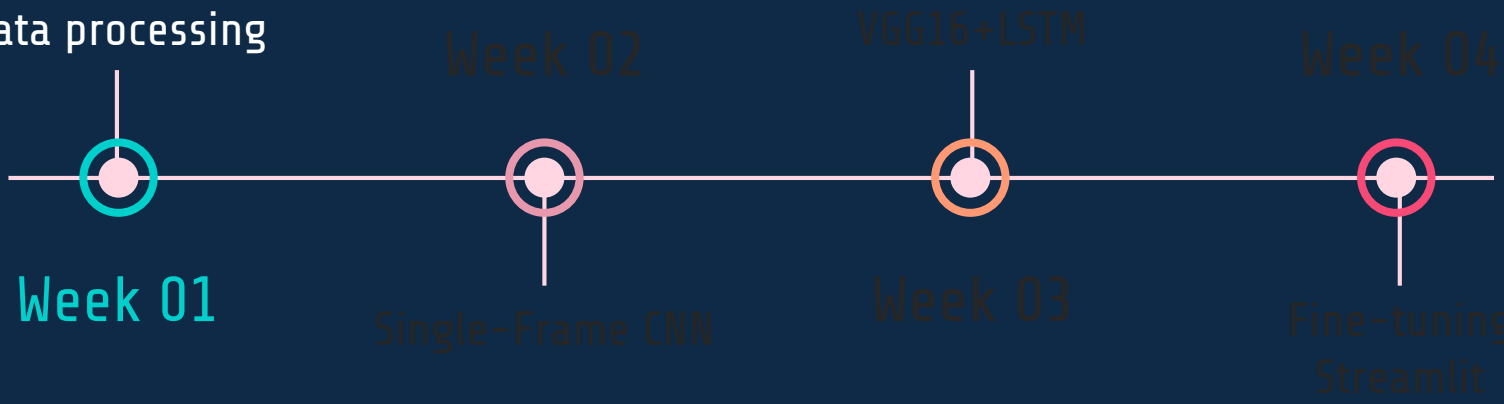
Applying Makeup
Boxing
Lecturing
Marching
Playing Golf
Pull ups
Push ups
Weightlifting

Source: UCF 101

200–250 videos per class

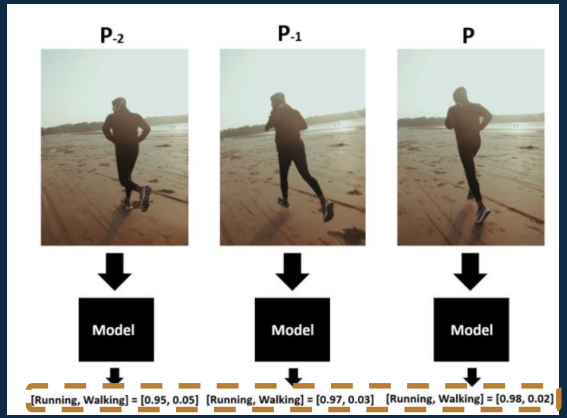
3s–12s per video

Resized input frames to (64x64x3)



Model Architecture

Layer (type)	Output Shape
conv2d_2 (Conv2D)	(None, 62, 62, 128)
conv2d_3 (Conv2D)	(None, 60, 60, 128)
batch_normalization_2 (Batch	(None, 60, 60, 128)
max_pooling2d_1 (MaxPooling2	(None, 30, 30, 128)
global_average_pooling2d_1 (	(None, 128)
dense_2 (Dense)	(None, 128)
batch_normalization_3 (Batch	(None, 128)
dense_3 (Dense)	(None, 8)



Accuracy

Loss

Data processing

Week 01

Week 02

Single-Frame CNN

VGG16+LSTM

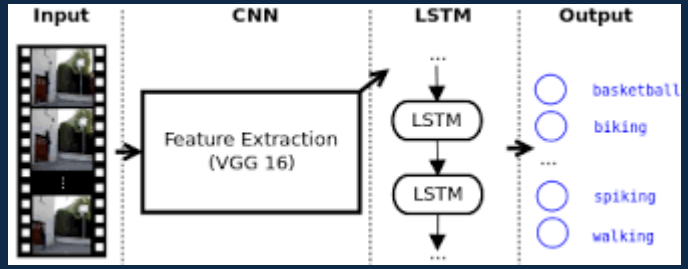
Week 03

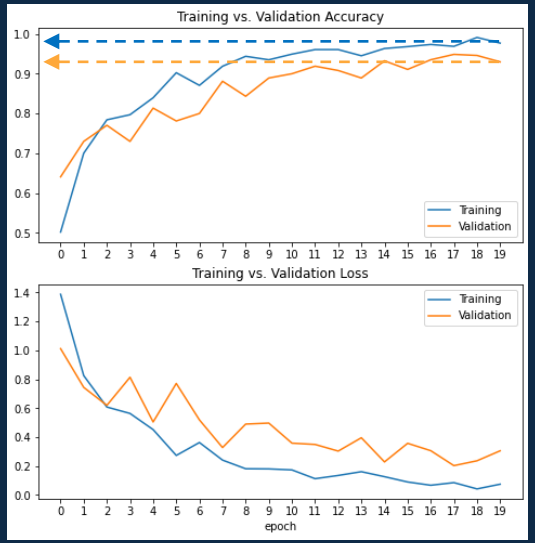
Fine-tuning

Streamlit

Model Architecture

Layer (type)	Output Shape
input_1 (InputLayer)	[(None, 70, 64, 64, 3)]
time_distributed (TimeDistri	(None, 70, 512)
lstm (LSTM)	(None, 256)
dropout (Dropout)	(None, 256)
dense (Dense)	(None, 1024)
dense_1 (Dense)	(None, 8)





Data processing

Week 01

Week 02

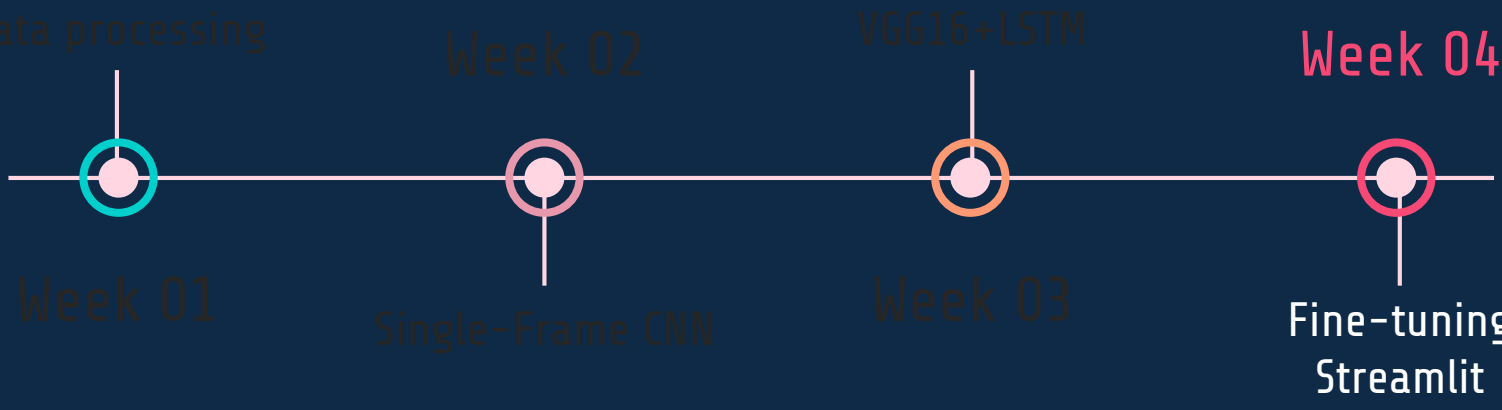
Single-Frame CNN

VGG16+LSTM

Week 03

Fine-tuning
Streamlit

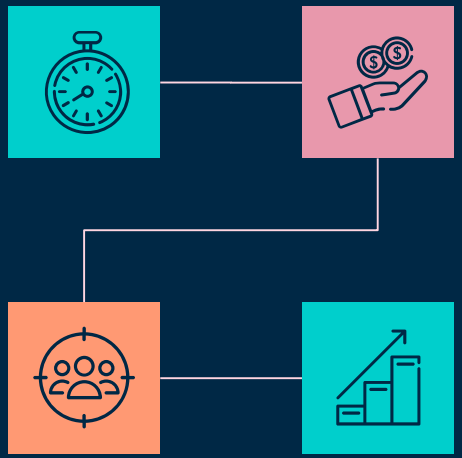
Sensitivity Analysis:
Dropout rate (20%-40%)
Numbers of layers
Batch size (16-64)



Demo

Where it goes from here....

Comparing performance between different sequence models (bidirectional, fusion...)



Training with better GPU. Apply noise filter (such as background...)

Streamline product for publishing

Monitor & continue to improve model

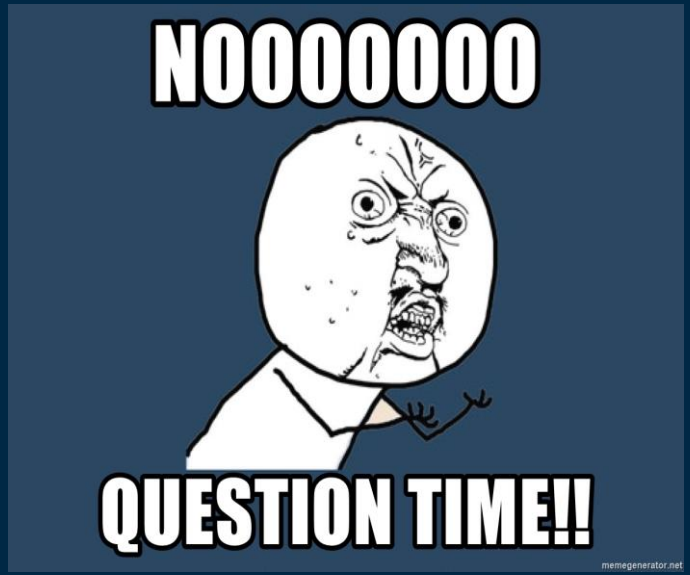
References

Sources

- https://learnopencv.com/introduction-to-video-classification-and-human-activity-recognition/Dashboard element collection
- https://thebinarynotes.com/video-classification-keras-convlstm/Dashboard element collection template
- https://www.analyticsvidhya.com/blog/2019/09/step-by-step-deep-learning-tutorial-video-classification-python/

Dataset

- UCF101 .... Check out the link **here**


NOOOOOOO
QUESTION TIME!!
memegenerator.net

CoderSchool