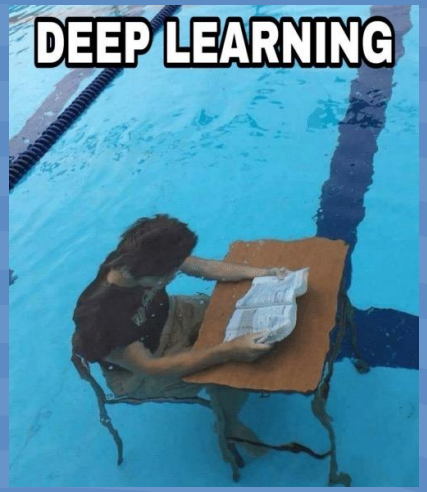


Deep Learning on Sports Recognition

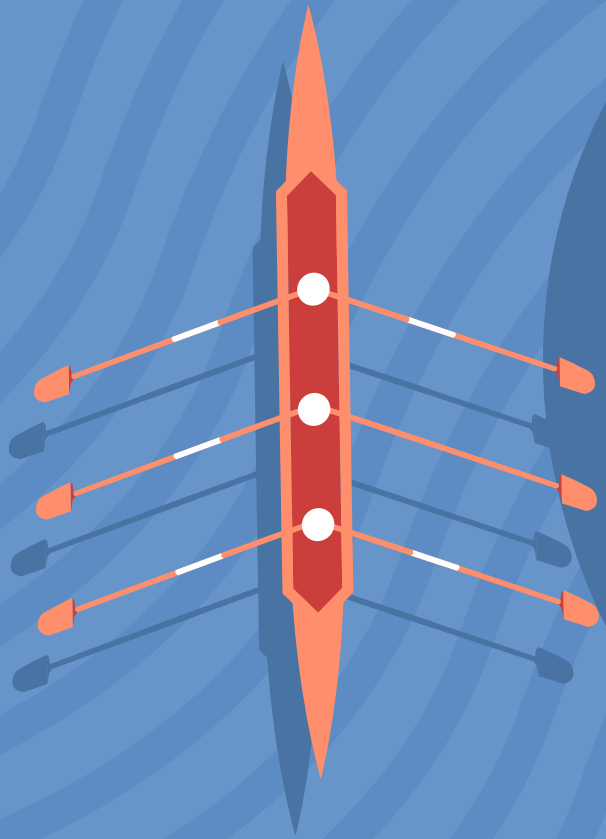
Group 3

Jingxi Liu (jliu238)

Yuetong Liu (yliu390)

Yingkun Wang (ywang601)

Jiaqian Zhong (jzhong16)



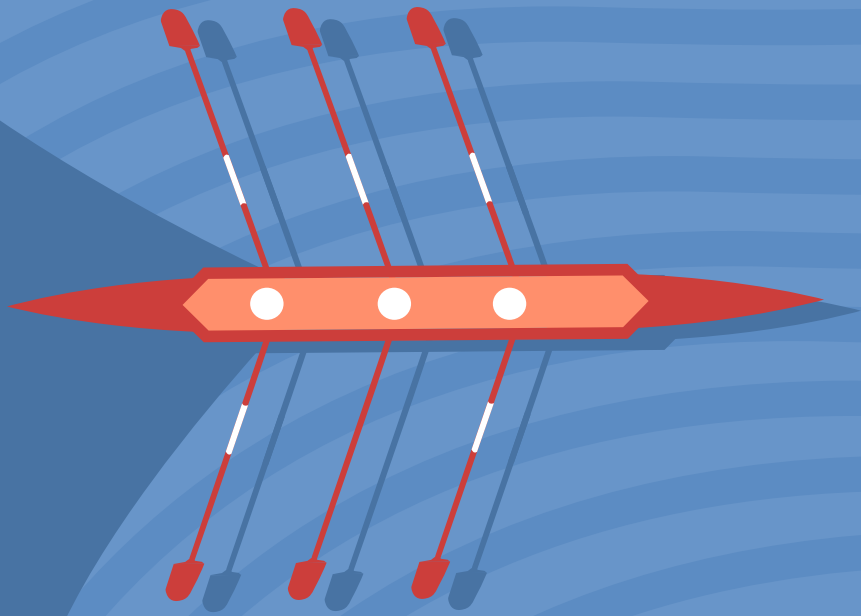
INTRODUCTION

- Video Classification Problem & Supervised learning
- Goal → Classify actions related to sports
- Method → 2D & 3D CNN

01 Data Insight

02 CNN Models

03 Result and Discussion



Data Insight

UCF101--Sports

UCF101 --- the largest dataset of human actions

-Over 13k clips and 27 hours of video data

-101 classes of human actions

-Fixed frame rate of 25 FPS and resolution of 320 × 240 pixels

Actions	101
Clips	13320
Groups per Action	25
Clips per Group	4-7
Mean Clip Length	7.21 sec
Total Duration	1600 mins
Min Clip Length	1.06 sec
Max Clip Length	71.04 sec
Frame Rate	25 fps
Resolution	320×240
Audio	Yes (51 actions)

Table 1. Summary of Characteristics of UCF101

Data selected in our study ⇒

-1250 videos in 50 classes of sports actions

-Extract 1 video for each group and 25 video for each action

-Preprocess →

Turn to black and white

20 frames average for each video

Compress to 256×256

Models

Dense NN & Pre-trained
VGG16

2D-Dense NN

Pre-trained

VGG16

1000 Classes
90% Accuracy

Dropout

Prevent
Overfit

Dense

Layers

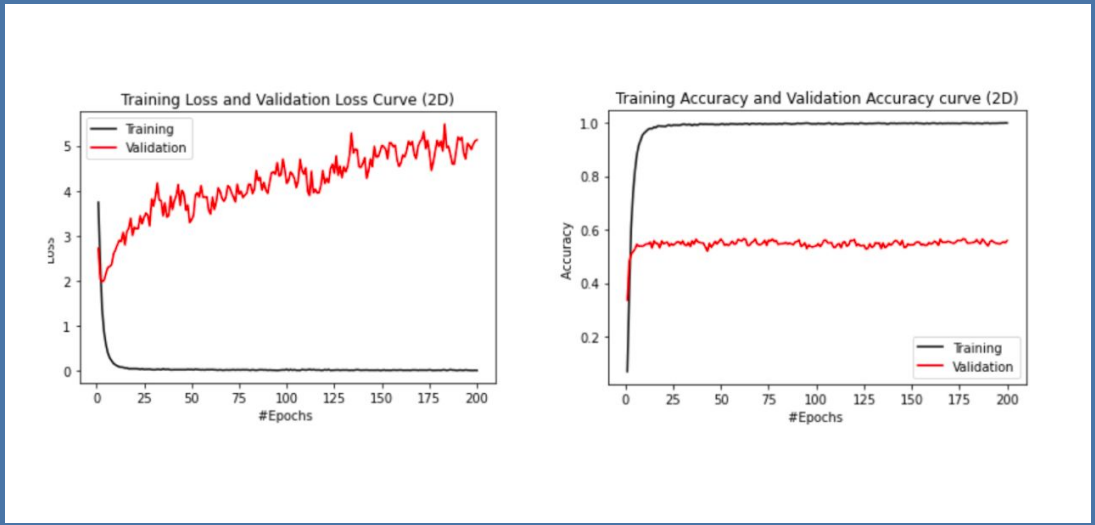
512, 256, 128, 64

Activation

Relu
Sigmond

2D-Dense NN

Visualization



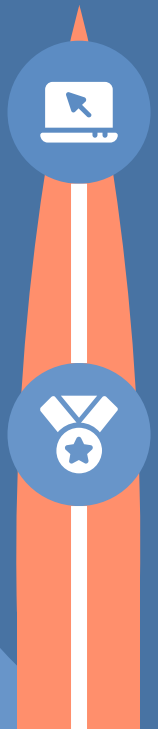
Accuracy

54%

Models

3D-CNN

3D-CNN



4 Conv3D layers

Preserve the temporal information

4 Dense layers

Adds non-linearity

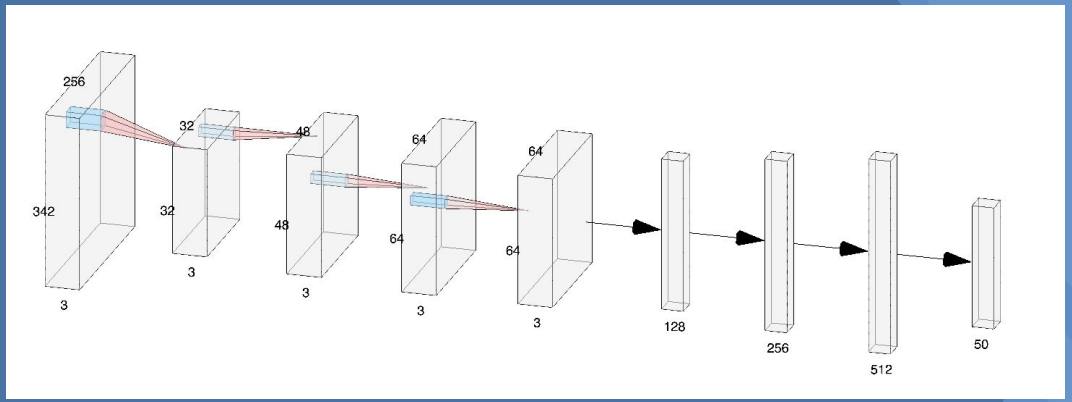
Output predicted sports

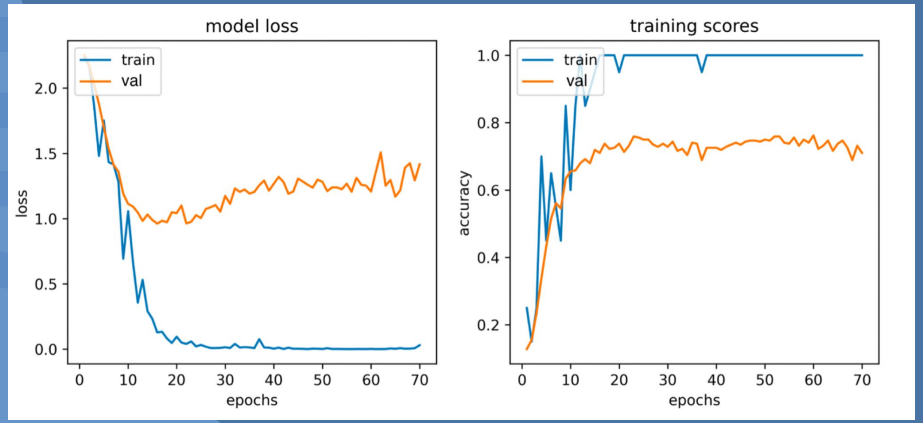
Cross Entropy Loss

Learning rate 0.0001

Batch size 20

Epoch 70


256
342
3
32
32
3
48
48
3
64
64
3
64
64
3
128
256
512
50


model loss
train
val
loss
epochs
training scores
train
val
accuracy
epochs

04

Result & Discussion

Results

	Training Epoch	Testing Accu
2D-CNN	200	54%
3D-CNN	70	72.49%

Needs Improve

Input Size

Select more frames

No crop

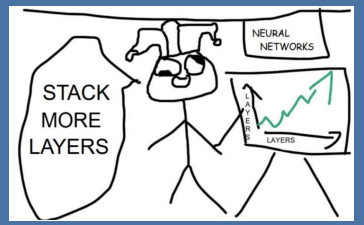
(320x240) -> (256x256)

Colors

Include colors

Layers

Add more layers



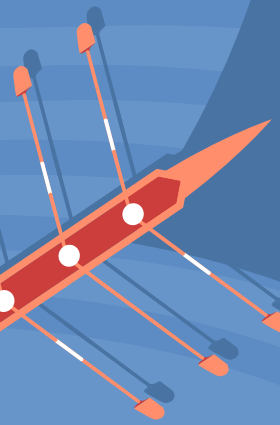
Future Work

01 Winner Prediction

Predict which team wins the competition

02 Detect Violations

Check if athletes violate rules



Deep Learning

What society thinks I do

What my friends think I do

What other computer scientists think I do

What mathematicians think I do

What I think I do

```
from theano import *
```

What I actually do

THANK YOU

Do you have any questions?