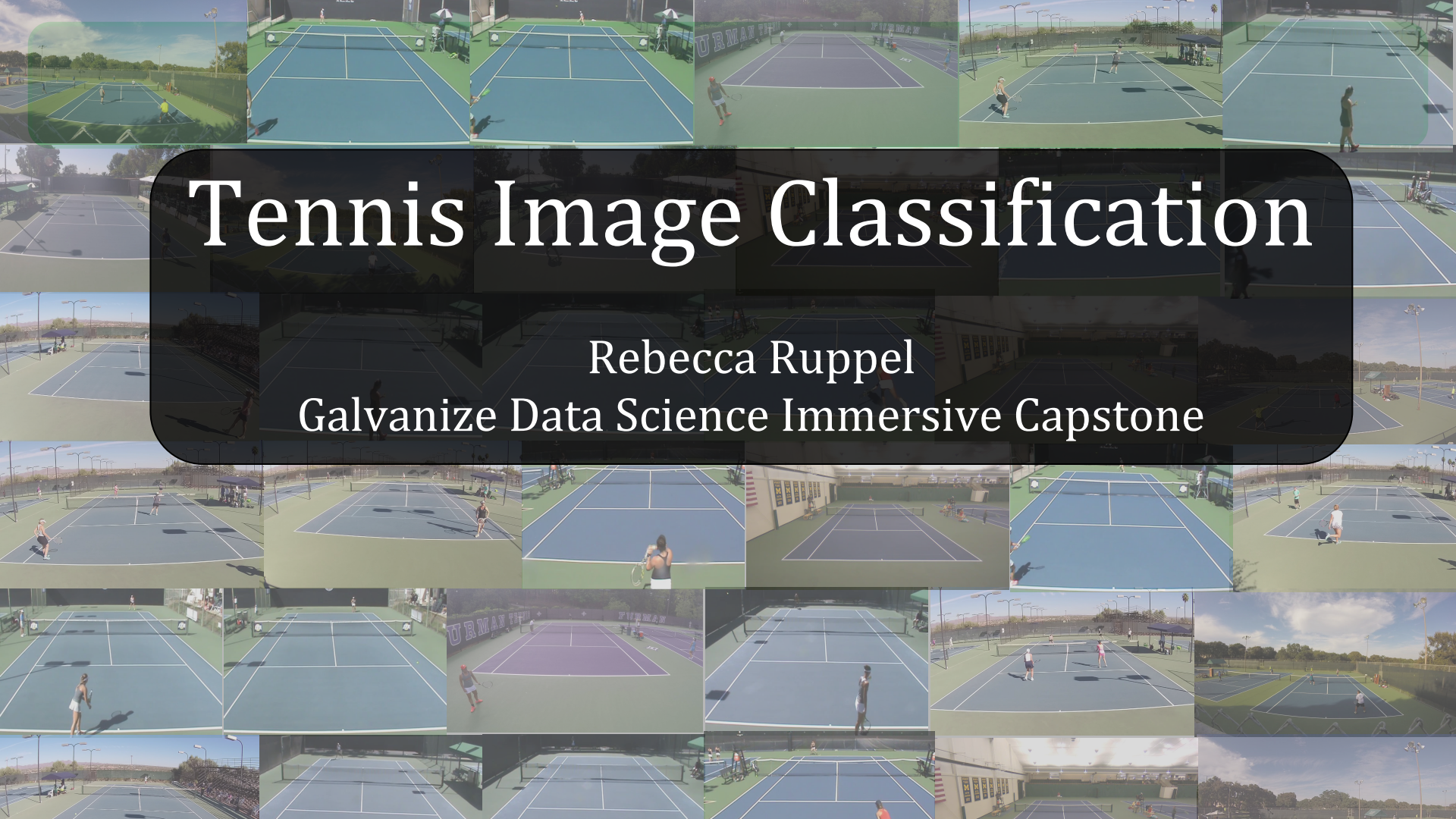

Tennis Image Classification

Rebecca Ruppel
Galvanize Data Science Immersive Capstone

Supervised Learning

Labeled Data

Train Model

Predictions on Unlabeled Data

Random Forests

Neural Networks

Support Vector Machines

Naive Bayes

Supervised Learning

Labeled Data

Train Model

Predictions on Unlabeled Data

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Support Vector Machines

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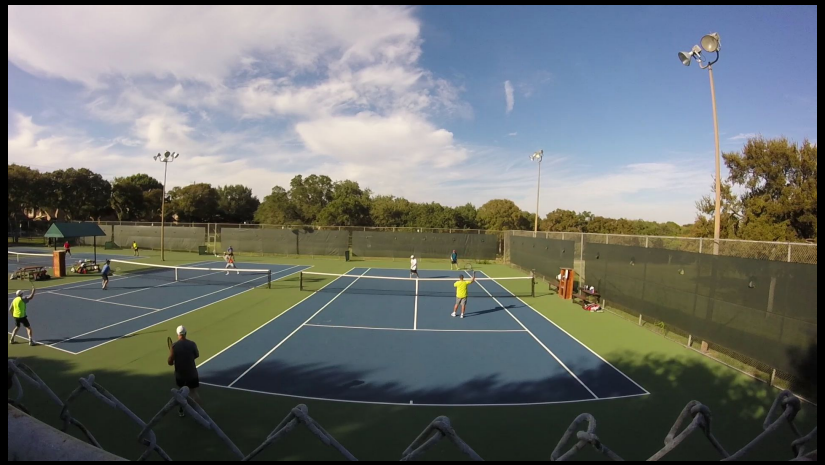
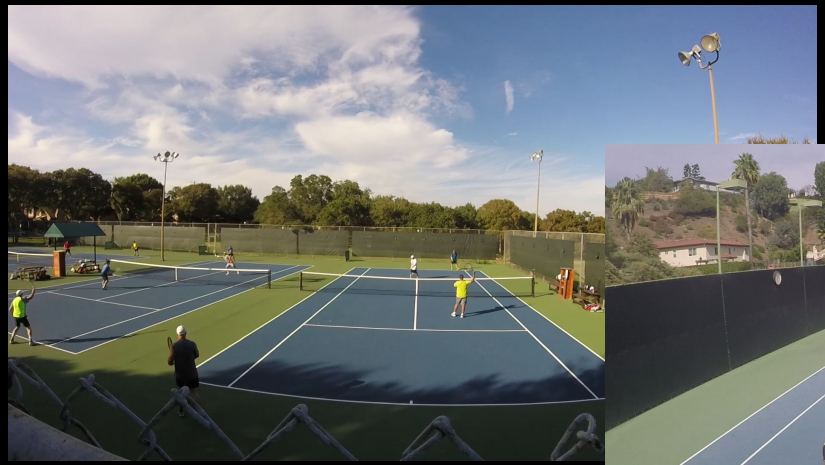
Cizr Data



Outside Point

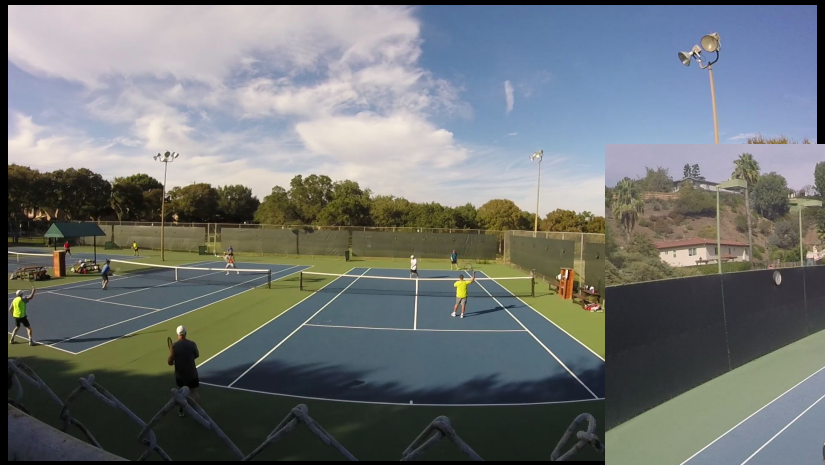
Cizr Data



Outside Point

Serve

Cizr Data

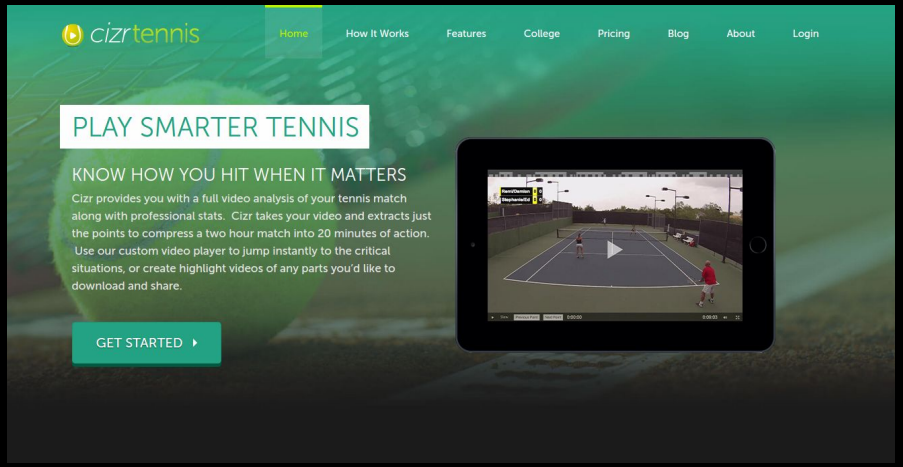


Outside Point

Serve

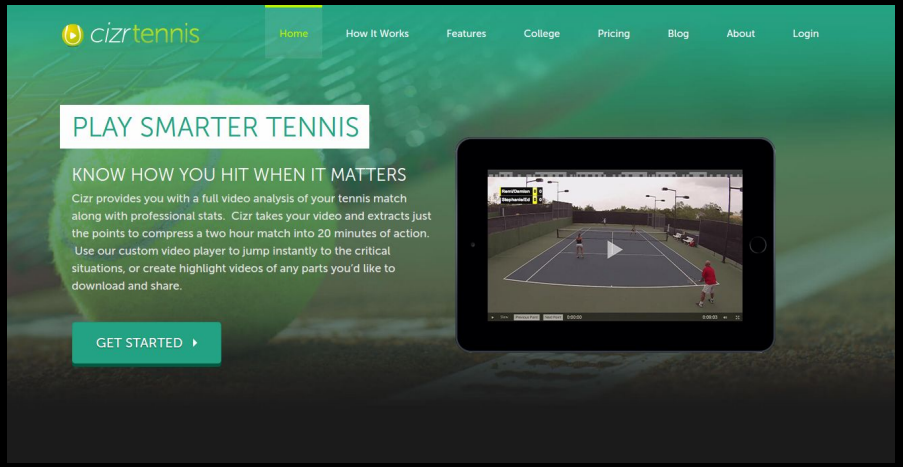
Inside Point

Cizr: Tennis video classification



- Tags tennis video to separate active play from rest of video
- Processes user video into active play
- Video data is categorized by hand

Cizr: Tennis video classification



- Tags tennis video to separate active play from rest of video
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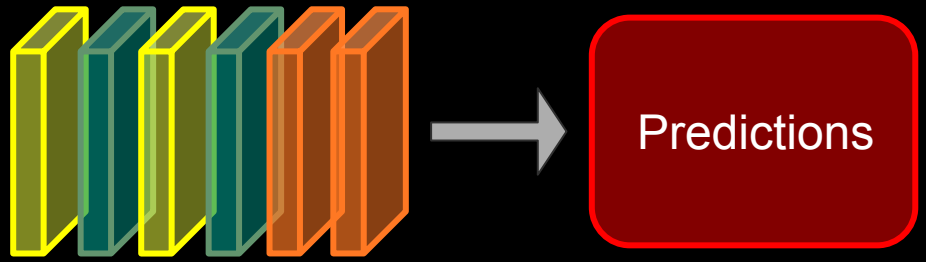
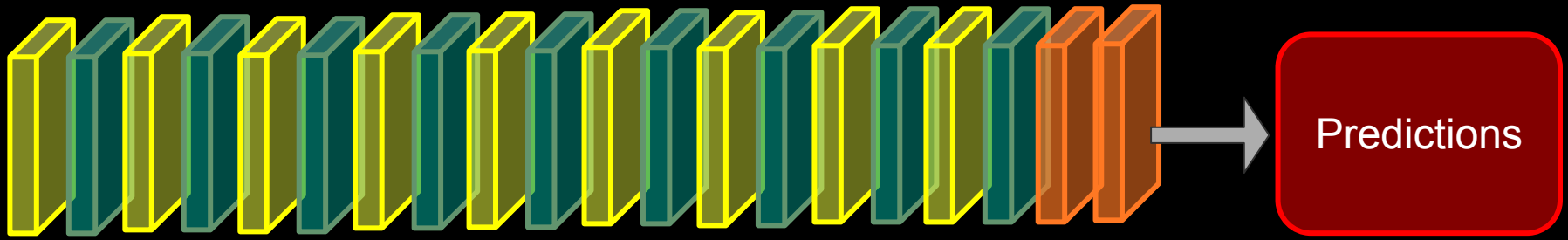
Neural network could be used to automate classification process

Deep Learning

Neural Network

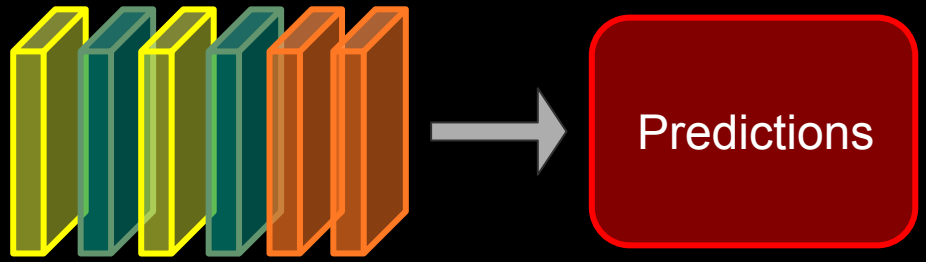


Deep Neural Network

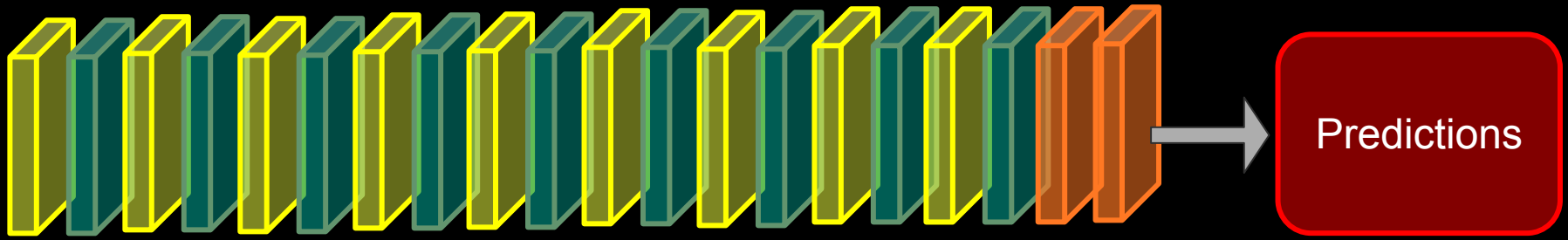


Deep Learning

Neural Network

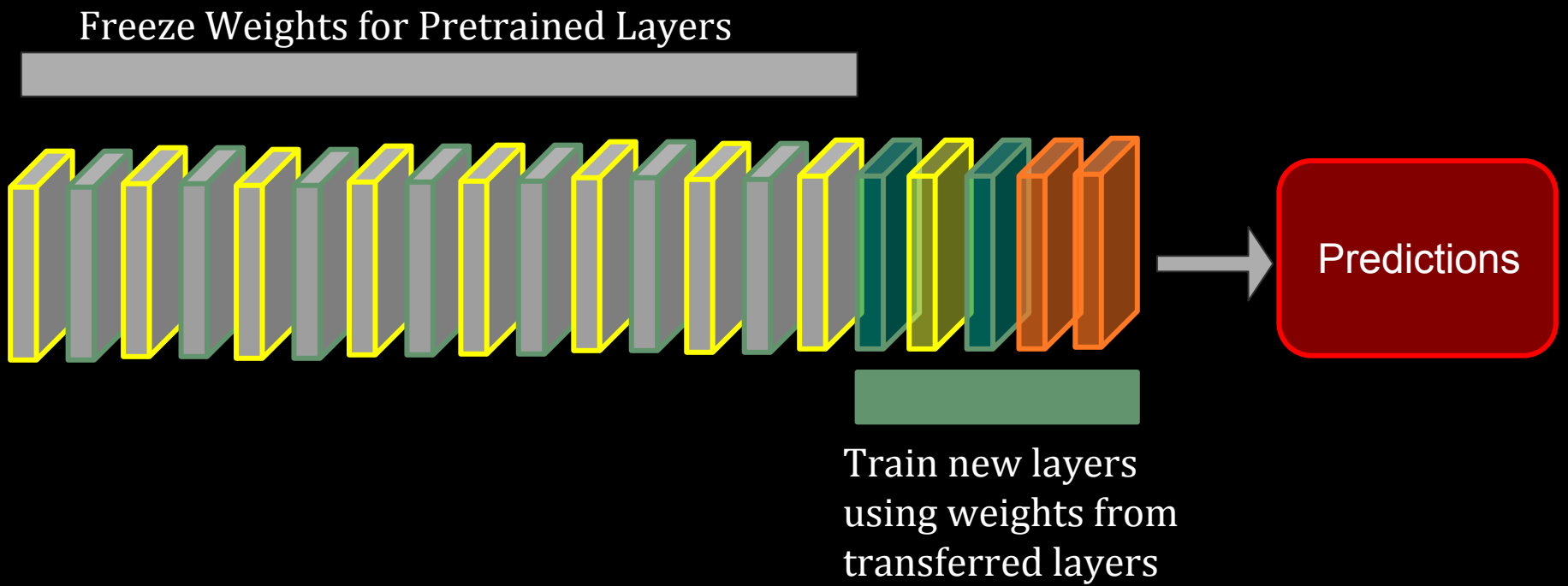


Deep Neural Network

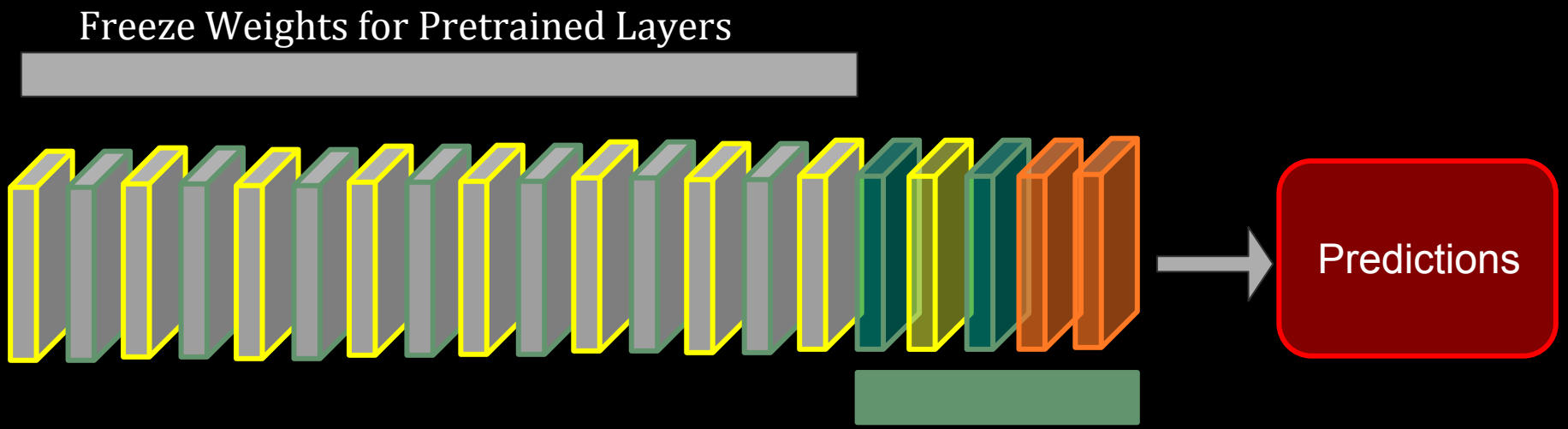


Sadly, these take weeks to train on large datasets...

Deep Learning & Transfer Learning



Deep Learning & Transfer Learning



VGG16 ImageNet 2014 competition
Very Deep Convolutional Networks for Large-Scale Image Recognition
K. Simonyan, A. Zisserman
arXiv:1409.1556

Model Performance

6,000 images
4,800 Train/2,200 Validation

Predicted

Labels	Inside Point	Serve	Outside Point
Inside Point	347	222	122
Serve	82	564	59
Outside Point	139	204	338

Validation Accuracy: 60%

Model Performance

6,000 images
4,800 Train/2,200 Validation

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Predicted

Labels	Inside Point	Serve	Outside Point
Inside Point	1333	344	486
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Outside Point	310	350	1367

Validation Accuracy: 66%

Model Performance

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Predicted

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Outside Point	310	350	1367

Validation Accuracy: 66%

Using Video in Neural Networks

Outside Point

Inside Point

Using Video in Neural Networks

Outside Point

Inside Point

Questions?

Rebecca Ruppel's Contact information

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- https://www.linkedin.com/in/rebecca-ruppel