



# What Objects Are Where?

## Using Rich Feature Hierarchies

S21 CSE 571 Computer Vision  
International Institute of Information Technology Hyderabad



# Team reVision



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Code

**doltonfernandes** Pushed results

b5931e0 18 hours ago 48 commits

.github	GitHub Classroom Feedback	3 months ago
assets	readme files updated	18 hours ago
docs	mid-evals: project report added	29 days ago
img	Added feature extraction	29 days ago
results/selective_search	selective search sample results uploaded	28 days ago
src	Pushed results	18 hours ago
README.md	readme initial version added	18 hours ago

README.md



# What Objects Are Where? Object Detection With Rich Feature Hierarchies

Object detection is one of the most fundamental and challenging problems in computer vision. It deals with detecting instances of a certain class in digital images and forms the basis of many other computer vision tasks such as instance segmentation, image captioning, object tracking, etc.

## About

project-revision created by GitHub Classroom

[Readme](#)

## Releases

No releases published  
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## Packages

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## Contributors

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## Languages

# What Objects Are Where?



(a)



(b)



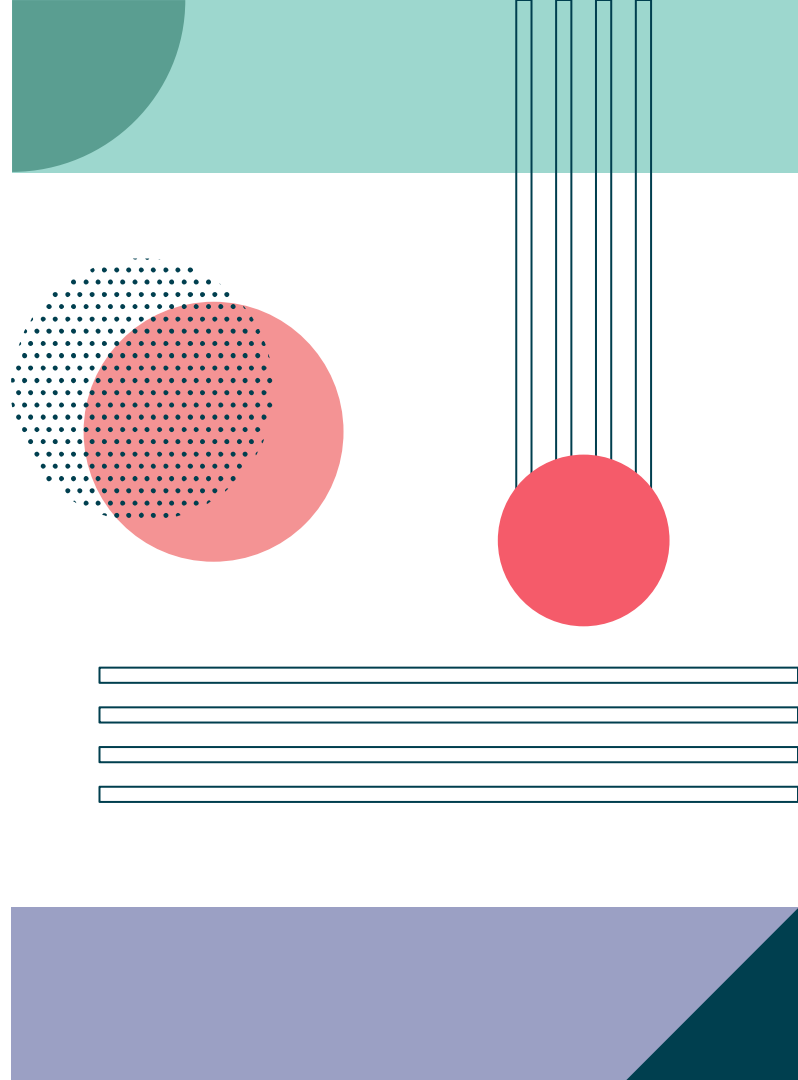
(c)



(d)



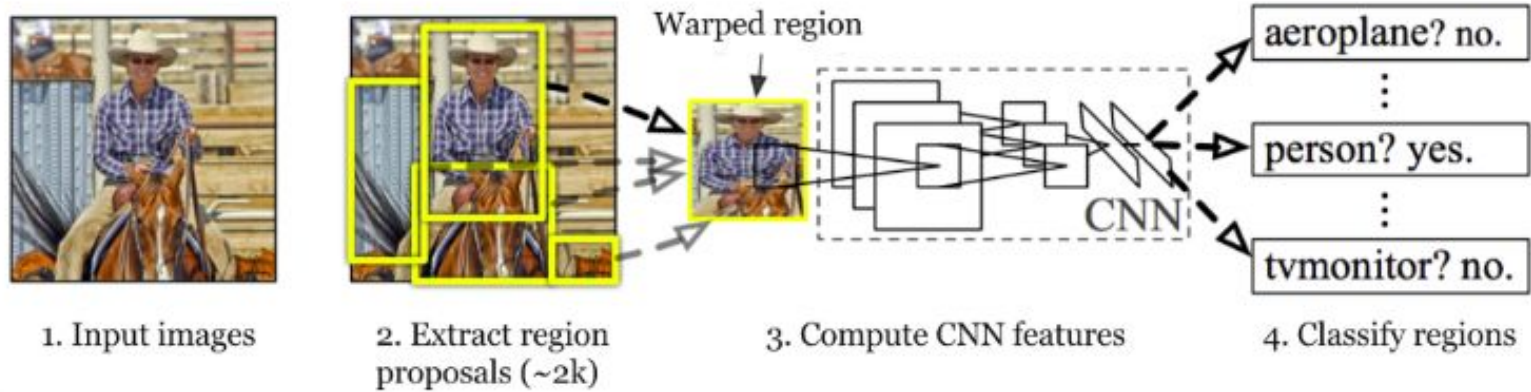
9



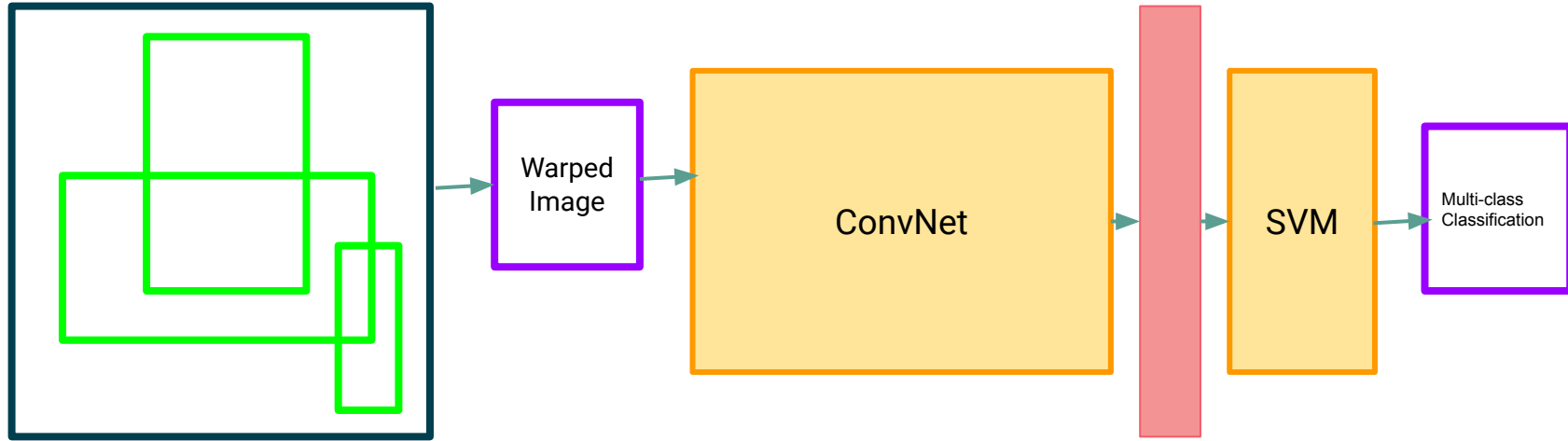
# reVisiting Project Timeline



# Object Detection Workflow in R-CNN



# Object Detection Workflow in R-CNN





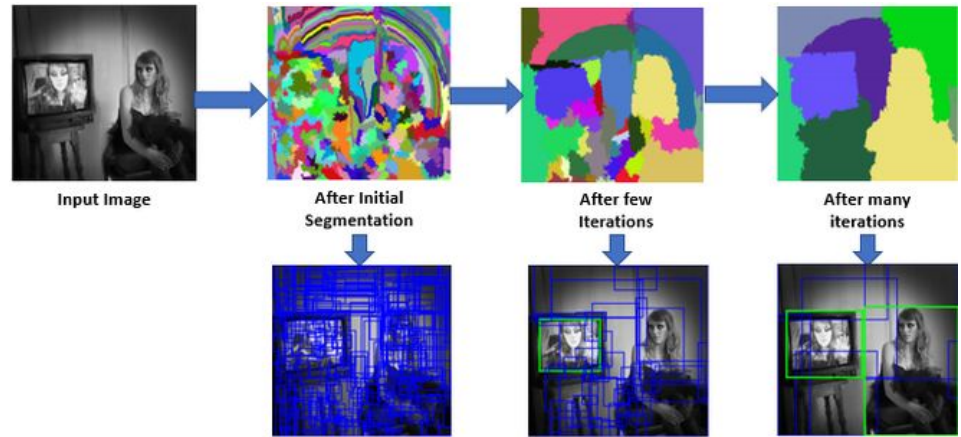
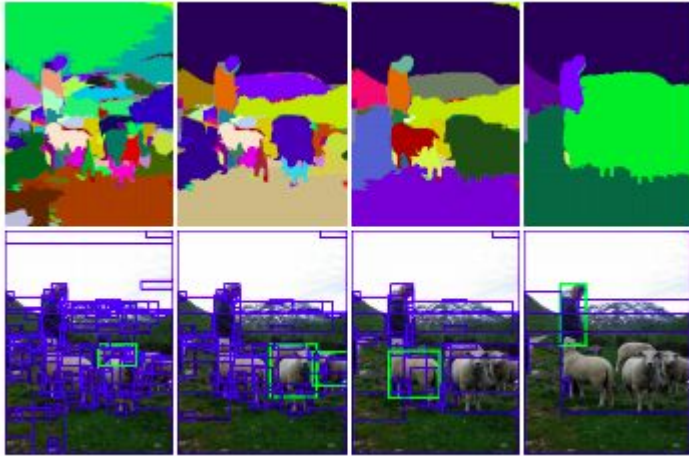
1

# Object Recognition

Selective Search and Region Proposals



# Selective Search and Region Proposal



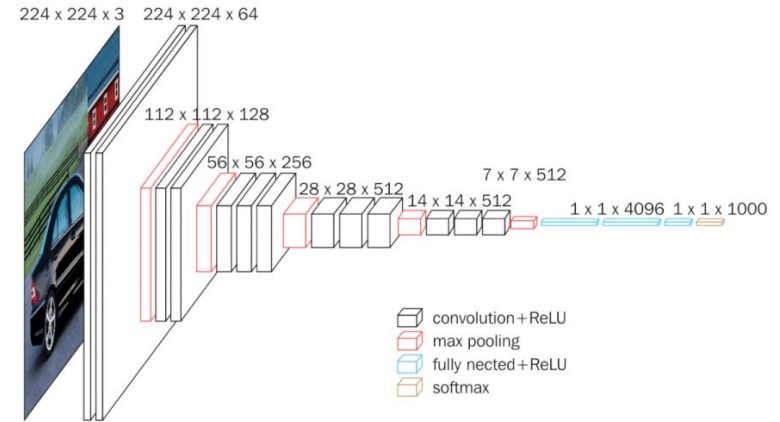
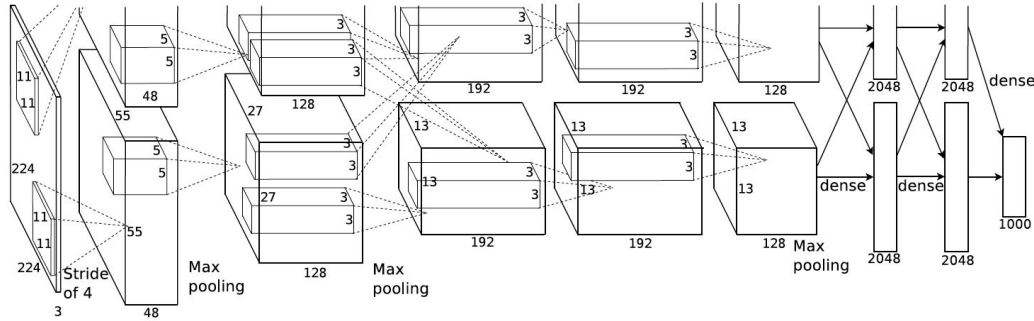


2

# Learning Representations

Feature Extraction using ConvNets

# Convolutional Neural Networks



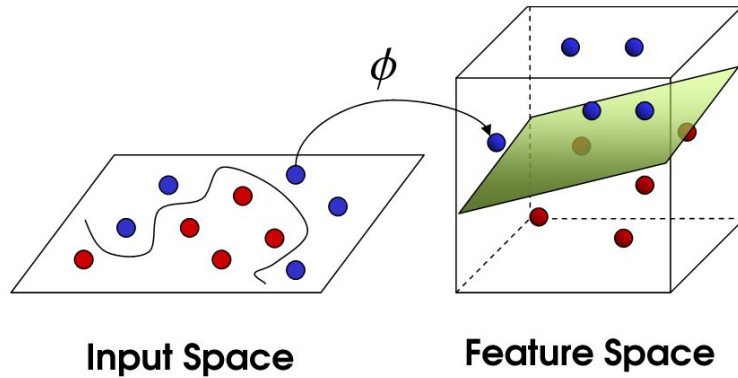


3

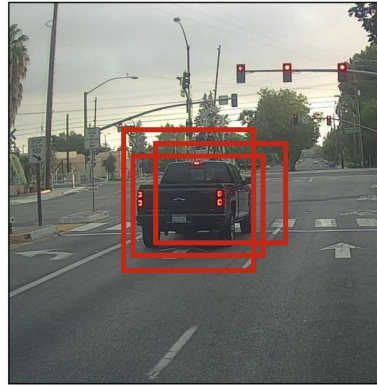
# Object Classification

Support Vector Machines

# Support Vector Machine Classifier



Before non-max suppression



After non-max suppression



Non-Max  
Suppression





# Experiments and Empirical Results



A

AlexNet Pre-trained

Train: 92.18% (Accuracy)  
Val/Test: 86.13%

B

AlexNet Fine-tuned

Train: 93.20% (Accuracy)  
Val/Test: 89.41%

C

VGG16 Pre-trained

Train: 93.68% (Accuracy)  
Val/Test: 87.77%





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