

# Month 5: Computer Vision

## Overview & Schedule (Weeks 17-20)

### Week 17: CNN Fundamentals

Day	Topic	Theory (Brief)	Practice (Brief)	Time
Day 1	Convolutions & Pooling	Watch: StatQuest's Convolutional Neural Networks (15 min). Concept: Filters d...	Python: Apply a vertical edge detection filter `[[1,0,-1], [1,0,-1], [1,0,-1]]`.	2h
Day 2	CNN Architecture	Watch: DeepLearning.AI: Simple CNN Network (10 min). Structure: Conv -> ReLU ...	Python: Build a standard CNN in PyTorch (`nn.Conv2d`, `nn.MaxPool2d`).	2h
Day 3	Training CNNs	Concept: Data Augmentation importance for images.	Python: Train your CNN on FashionMNIST. Use `torchvision.transforms` to add r...	2h

### Week 18: Advanced Architectures

Day	Topic	Theory (Brief)	Practice (Brief)	Time
Day 1	Classic Architectures	Read: CNN Architectures: LeNet to ResNet (10 min).	Python: Load `torchvision.models.resnet18(pretrained=True)`. Print the model ...	2h
Day 2	Transfer Learning	Watch: Transfer Learning Explained (10 min). Concept: Freezing early layers, ...	Python: Fine-tune ResNet18 to classify 'Ants vs Bees' (download small dataset).	2h
Day 3	Data Augmentation	Viz: Look at how augmentation changes images. Read PyTorch docs on Transforms.	Code: Create a visualization grid showing 1 original image and 5 augmented ve...	2h

## Week 19: CV Tasks

Day	Topic	Theory (Brief)	Practice (Brief)	Time
Day 1	Object Detection Intro	Watch: YOLO Algorithm Explained (15 min). Concept: Grid Division + Bounding B...	Python (Inference): Load `ultralytics/yolov5` from Hub. Run inference on a ph...	2h
Day 2	Image Segmentation Intro	Watch: U-Net Architecture Explained (10 min). Concept: Pixel-wise classificat...	Demo: Run a pre-trained segmentation model (Mask R-CNN) from torchvision on a...	2h
Day 3	CV Project	Setup: Build a webcam Face Detector.	Code: Use OpenCV `cv2.CascadeClassifier` (Haar Cascades) or a DL model for re...	3h

## Week 20: Month 5 Review

Day	Topic	Theory (Brief)	Practice (Brief)	Time
Day 1	Review	Consolidate CNN knowledge.	Refactor your CV project code.	2h