Computer vision

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Week 1: Introduction to Computer Vision

Understanding Basics

- Objective: Gain a foundational understanding of computer vision and its applications.
- Resources:
    - Read introductory articles and watch videos about computer vision.
        - Introduction to Computer Vision
    - Book: "Computer Vision: Principles, Algorithms, Applications, Learning" by E.R. Davies (Chapter 1).

Basic Image Processing

- Objective: Learn basic image processing techniques using Python.
- Resources:
    - OpenCV documentation and tutorials.
    - Practice with OpenCV on image manipulation tasks (e.g., filtering, edge detection, transformations).
        - OpenCV Tutorial on GeeksforGeeks

Week 2: Deep Dive into CNNs

Foundations of Convolutional Neural Networks (CNNs)

- Objective: Understand the theory and application of CNNs.
- Resources:
    - Course: CNN Course by Andrew Ng on Coursera.
        - Convolutional Neural Networks by Andrew Ng
    - Book: "Computer Vision: Principles, Algorithms, Applications, Learning" by E.R. Davies (Chapters on CNNs).

Week 3: Implementing CNNs

- Objective: Implement CNNs using frameworks like TensorFlow and PyTorch.
- Resources:
    - TensorFlow/Keras documentation.
        - Introduction to TensorFlow
    - PyTorch tutorials.
        - Introduction to PyTorch
    - Practice by implementing classic CNN architectures (e.g., LeNet, AlexNet, VGG).

Week 4: Advanced Topics in Computer Vision

Advanced CNN Architectures and Techniques

- Objective: Learn advanced CNN architectures and techniques like transfer learning, data augmentation, and fine-tuning.
- Resources:
    - Course: Continue with advanced sections in Andrew Ng's Coursera specialization.
    - Book: "Computer Vision: Principles, Algorithms, Applications, Learning" by E.R. Davies (Advanced topics and applications).

Week 5: Object Detection and Segmentation

- Objective: Understand and implement object detection and segmentation models.
- Resources:
    - Research papers on YOLO, SSD, Faster R-CNN.
    - Tutorials on object detection with TensorFlow/PyTorch.
        - Object Detection using TensorFlow
    - Practice with popular datasets like COCO and Pascal VOC.

Week 6: Specialized Computer Vision Applications

Generative Models in Computer Vision

- Objective: Learn about GANs and their applications in image generation.
- Resources:
    - Research papers on GANs (e.g., Goodfellow et al., 2014).
    - Implement GANs using TensorFlow/PyTorch.
        - Generative Adversarial Networks (GANs)
    - Explore advanced GAN variants (e.g., StyleGAN, CycleGAN).

Week 7: Real-time Computer Vision Applications

- Objective: Build applications that utilize real-time computer vision.
- Resources:
    - OpenCV documentation for video processing.
    - Tutorials on integrating models with real-time systems (e.g., deploying on edge devices).
        - Real-time Object Detection

Week 8: Projects and Continuous Learning

Capstone Projects

- Objective: Apply the knowledge by working on real-world computer vision projects.
- Project Ideas:
    - Image classification app.
    - Real-time object detection system.
    - AI-based image generator.

Staying Updated

- Objective: Keep up with the latest advancements in computer vision.
- Resources:
    - Follow top conferences (CVPR, ICCV, ECCV).
    - Subscribe to research journals and blogs.
    - Participate in online forums and communities (e.g., Reddit, Stack Overflow).