

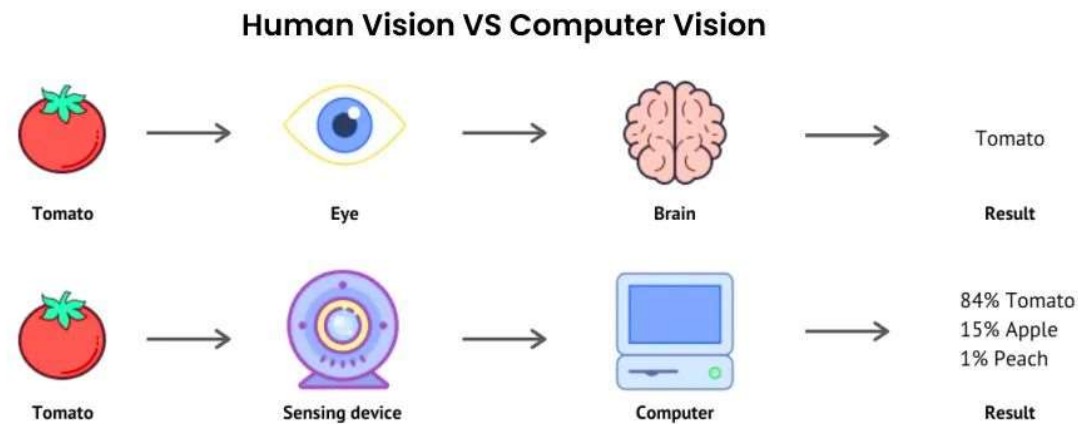
Computer Vision for Pattern Recognition

Presented by:

Duy-Anh Dang
Manjesh Prasad
Nicolas Yuan
Shuzhu Chen

What is computer vision?

- ❖ The ability to see, process, and receive data just like humans
- ❖ Based on pattern recognition



Why computer vision matters?

- ❖ Enables machines to "see" and understand the world
- ❖ Automates tasks and improves efficiency
- ❖ Enhances user experience



Advantages VS. disadvantages

Advantages:

- Faster and simpler process
- Reliability and Accuracy
- The reduction of costs



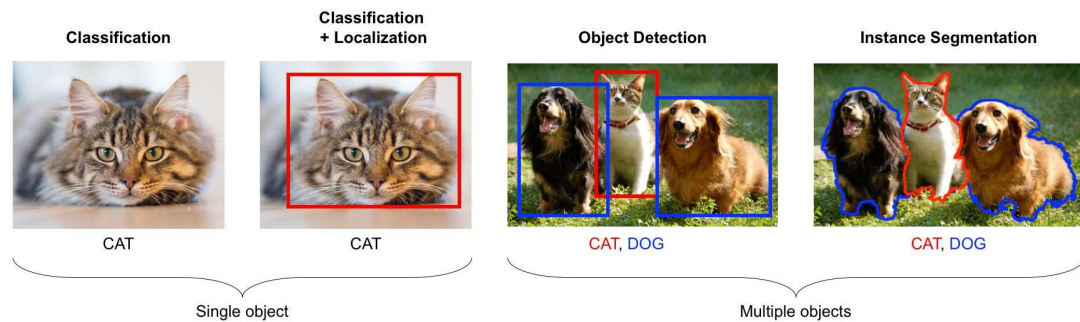
Disadvantages:

- Data dependency
- Need for regular monitoring
- Limited generalization

Applications of Computer Vision

⇒ Use cases of the Computer Vision

- Object Detection
- Object Classification
- Object Verification
- Object Landmark
- Object Recognition



⇒ Why is it important?

Combinations of those applications enables automation of task that traditionally require human visual capabilities. This includes tasks such as object detection, recognition, tracking, and classification, which are crucial in various industries like autonomous vehicles.

Human Vision vs Computer Vision

Human Vision:

- Manuel Inspection
- Subjectively
- Limited Scale

Computer Vision:

- Automated Recognition
- Objectively
- Scalability
- Less Error



Image of my study table



Object Detection by Computer Vision

The AI behind Computer Vision

⇒ Pattern Recognition

⇒ Certain model/syntax recognition

⇒ Example of Good Pattern recognition/improper recognition

⇒ Facial recognition: Used for security, marketing, and entertainment

⇒ Medical imaging analysis: Used for disease diagnosis and treatment planning

⇒ Autonomous vehicles: Used for self-driving cars and other intelligent transportation systems

⇒ Industrial inspection: Used for quality control and defect detection

⇒ Retail: Used for product identification and personalized recommendations

The Pipeline of a CV System Design

- ❖ 1) Requirement Analysis
- ❖ 2) Data Collection and Preprocessing
- ❖ 3) Feature Extraction and Representation
- ❖ 4) Model Selection and Training
- ❖ 5) Evaluation and Validation
- ❖ 6) Optimization and Fine-Tuning
- ❖ 7) Monitoring and Maintenance

