Computer Vision in Artificial Intelligence

1. What is Computer Vision in Artificial Intelligence?

Computer Vision is a branch of Artificial Intelligence that enables computers to understand, analyze, and interpret visual information from images and videos just like humans do.

2. Three Real-Life Examples of Computer Vision

1.	Face Recognition – Used in smartphones and security systems.
2.	Self-Driving Cars – To detect lanes, pedestrians, and vehicles.
3.	Medical Imaging – Helps detect diseases in X-rays or MRI scans.

3. How is Computer Vision different from Human Vision?

Human Vision	Computer Vision
Uses eyes and brain to process images.	Uses cameras and algorithms.
Can easily understand context.	Needs large datasets to learn.
Adapts quickly to new visuals.	Needs retraining for new data.

4. Steps in How a Computer “Sees” an Image

1. Image Capture – Taking input from camera or sensor.
2. Image Processing – Enhancing image quality and removing noise.
3. Feature Extraction – Detecting colors, edges, and shapes.
4. Object Recognition – Identifying what is in the image.
5. Decision Making – Taking action based on recognition.

5. What is a Pixel and Its Importance

A pixel is the smallest unit of a digital image, storing color or brightness information. More pixels mean higher image clarity and detail.

6. How Colors Combine in a Pixel

Each pixel combines Red, Green, and Blue (RGB) values from 0–255 to form any color.

(255, 0, 0)	Red
(0, 255, 0)	Green
(0, 0, 255)	Blue
(255, 255, 255)	White
(0, 0, 0)	Black

7. Difference between Grayscale and Color Images

Grayscale Image	Color Image
Contains shades of gray only.	Contains multiple colors using RGB values.
Each pixel has one value (0–255).	Each pixel has three values (R, G, B).

8. 4×4 Pixel Grid Example (Letter “L” Shape)

0	0	0	0
1	0	0	0
1	0	0	0
1	1	1	1

1 = white pixel (visible), 0 = black pixel (background)

9. What is Image Preprocessing and Why is it Needed?

Image preprocessing means cleaning and preparing the image for better analysis. It removes noise, adjusts brightness, and enhances important parts. It improves accuracy and performance of computer vision models.

10. Uses of Computer Vision

a) Healthcare – Detects diseases from X-rays, CT scans, and MRI images. Assists doctors with AI-based diagnostics.

b) Transportation – Used in self-driving cars to detect traffic signs and obstacles. Helps in traffic monitoring and accident prevention.

c) Security – Used in face recognition for access control. Detects suspicious activities through CCTV cameras.

11. Two Online Tools/Platforms for Computer Vision Projects

1.	Google Teachable Machine – For training image recognition models easily.
2.	Microsoft Azure Custom Vision – For building and testing custom AI models online.

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