AI Domains

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Computer vision

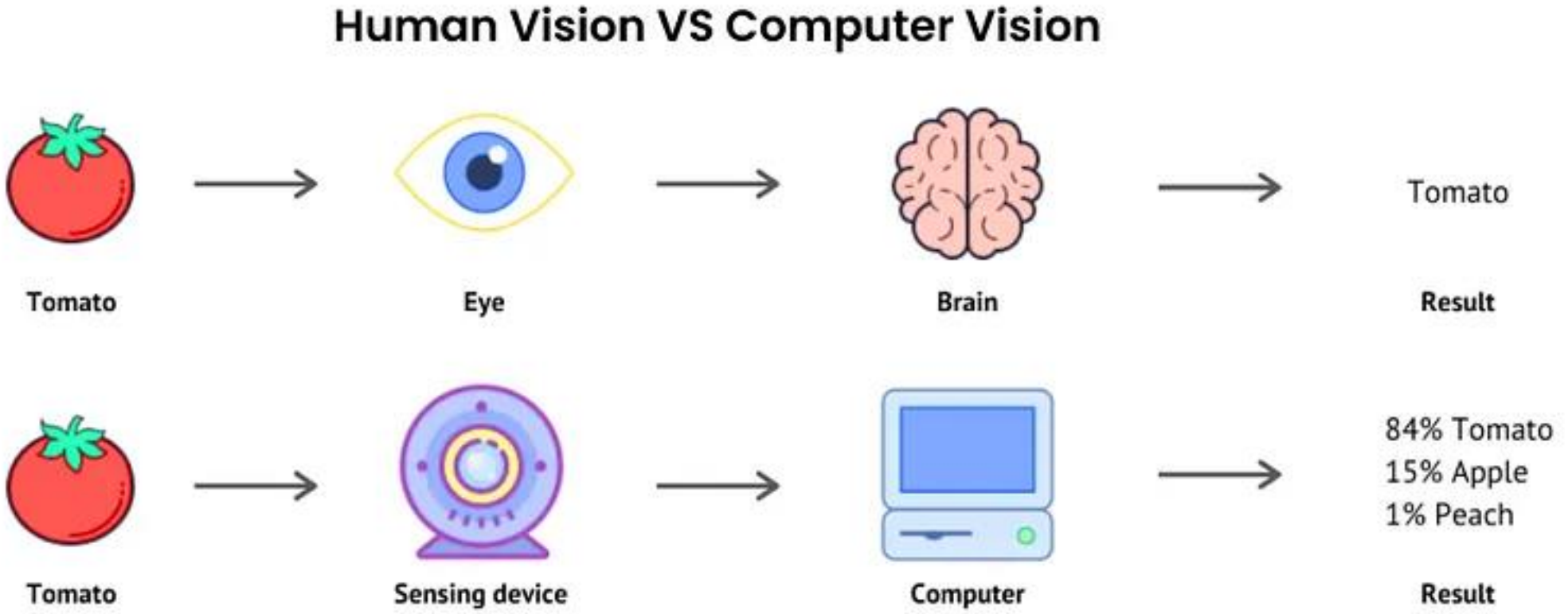
What is computer vision?

- Computer vision is a field of artificial intelligence that enables computers to interpret and understand the visual world, such as images or videos. It involves teaching machines to "see" and make sense of things like objects, faces, or scenes, similar to how humans use their eyes and brain to process what they see.

Introduction

- If AI enables computers to think, computer vision enables them to see, observe and understand.
- Computer vision is when computers can "see" pictures or videos and understand what's in them, like recognizing objects or faces. It's like giving a computer the ability to look and figure things out, just like we do with our eyes.
- Computer vision has many real-world applications like:
- Face recognition – The phone or camera can recognize your face and unlock when it sees you.
- Object detection – A self-driving car can "see" and recognize cars,
- Objects, and traffic signs on the road.

Computer vision work



How does computer vision work?

- Computer vision works by teaching a computer to recognize patterns in images or videos, just like how our brains interpret what we see. Here's how it works in simple steps:

1. **Capture the Image** – A camera or sensor takes a picture or video.
2. **Process the Image** – The computer breaks the image into tiny pieces and looks for patterns, shapes, colors, or edges in those pieces.
3. **Learn from Data** – The computer is trained using lots of images with labels (like "cat" or "car") so it learns what different objects look like.
4. **Make Predictions** – After learning, the computer can analyze new images, find patterns, and predict what it sees, like recognizing a dog or a tree.
5. **Output the Result** – Finally, the computer gives a response, like saying “This is a cat” or “This is a stop sign.”

Computer vision

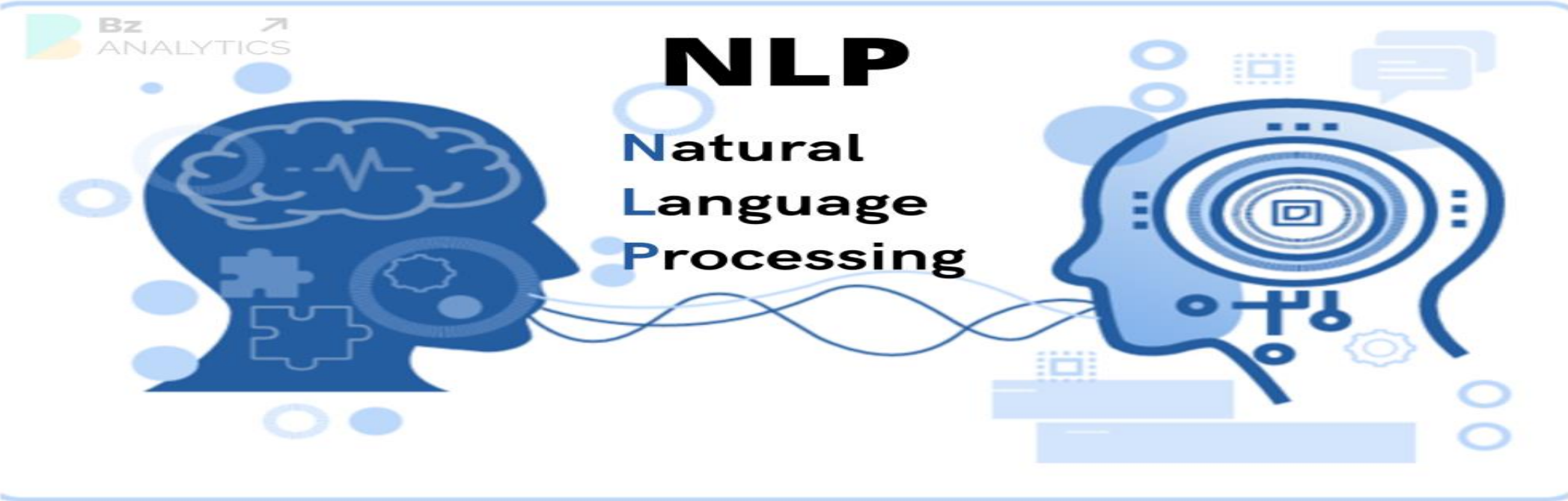
Computer vision examples:

Here are a few examples of established computer vision tasks:

- **Face unlock on phones** – The phone sees your face and unlocks.
- **Self-driving cars** – The car can see people, other cars, and stop signs to drive safely.
- **Google Photos** – It groups photos by recognizing things like "beach" or "dog.“
- **Barcode scanners** – Scanners read barcodes at stores using vision.
- **Security cameras** – Cameras can detect movement or recognize faces.
- **Augmented Reality (AR)** – Apps like Pokémon Go or Snapchat filters use computer vision to place virtual objects in the real world by recognizing physical spaces and objects around you.

What is NLP?

- NLP (Natural Language Processing) is a technology that helps computers understand and work with human language, like talking or writing. It's how computers can read, listen, and respond to what we say or write.



How NLP Works:

- **Input:**
  The computer gets your text or speech, like a question or a sentence (e.g., "What's the weather today?").

- **Breaking It Down:**
  The computer splits the sentence into smaller parts (like words or phrases) to understand it better. This is called **tokenization**.

- **Understanding the Meaning:**
  The computer looks at the words and tries to understand the meaning of each one. For example, it knows that "weather" is about the atmosphere and "today" means the current day.

- **Figuring Out Context:**

The computer also looks at the entire sentence to get the right meaning. It might figure out that “What’s the weather today?” is asking about today’s weather in your location.

- **Giving a Response:**

After understanding, the computer gives you an answer or performs an action. For example, it might say: “The weather is sunny today.”

- **Example:**

1. The computer breaks it into words: ["How", "are", "you"].
2. It understands that “you” is the person, and “how” is asking about the state or mood.
3. It responds with something like: “I’m good, thanks!”

Benefits of NLP:

- **Easier communication** – It helps us talk to computers in a natural way, like asking Siri or Alexa questions.
- **Language Translation** – NLP helps translate text or speech from one language to another, making it easier to communicate across language barriers.
- **Personalized suggestions** – It helps recommend things you might like, like movies or products, based on your preferences languages, so you can talk to people from different
- **Help for people with disabilities** – NLP can convert speech to text, making it easier for some people to communicate. countries.
- **Understanding feelings** – It can figure out if people are happy or upset in social media posts or reviews.

Examples of NLP:

- **Voice assistants** (like Siri or Alexa) understand your questions and respond.
- **Chatbots** on websites can talk to you and help answer questions.
- **Translation apps** (like Google Translate) can change text from one language to another.
- **Email Spam Filters** NLP helps sort out junk emails and keeps your inbox clean.
- In short, NLP helps computers "talk" to us in a way we can understand.

GENERATIVE AI?

What is generative AI?

- Generative AI is a type of artificial intelligence that can create new content, like text, images, music, or videos, by learning from existing data. Instead of just analyzing or recognizing things, generative AI *generates* something new based on patterns it has learned.
- In simple terms, generative AI is like a creative tool for computers, enabling them to make new things from scratch, whether it's writing a story, designing a picture, or composing a song.

How Generative AI works:

- **Training on Data**

Generative AI learns by looking at lots of examples of a certain type of content. For example, it might look at thousands of images of cats.

- **Finding Patterns**

The AI looks for patterns in the data. For instance, it learns what features make up a "cat" (like ears, whiskers, etc.).

- **Generating New Content**

After learning, the AI uses these patterns to create new things. For example, it can draw a new cat or write a new story based on the patterns it learned from the training data.

- **Refining and Improving**

The more data the AI gets and the more it works, the better it becomes at creating realistic and creative content. Some AI systems keep improving as they get more feedback (like adjusting its creations based on what humans like).

Technologies associated with Generative AI

- Deep Learning.
- Natural Language Processing (NLP).
- Neural Networks.
- Diffusion Models.

Applications of Generative AI:

1. **Text Generation:**

Example: Writing articles, stories, or even poetry.

AI like **ChatGPT** can generate text based on a prompt you give it, whether it's a question, a topic, or a conversation.

2. **Image Creation:**

Example: Creating images or artwork from descriptions.

Tools like **DALL·E** can take text prompts, like "a dog wearing a spacesuit," and create completely new, realistic images.

3. **Video Creation and Editing:**

Example: Creating videos or animations from text descriptions.

AI can generate videos based on your inputs, like turning a script into an animated scene or creating deepfake videos where faces are swapped.

Applications of Generative AI:

4. **Chatbots and Virtual Assistants:**

Example: Generating conversational responses in customer service or support.

AI can chat with users, answering questions or helping with tasks, like booking a flight or troubleshooting an issue.

5. **8. Gaming:**

Example: Creating game characters, levels, or even entire stories.

AI can design new game environments, characters, and plots, making each gaming experience unique.

Examples of Generative AI:

1. **ChatGPT**: Generates human-like text responses.

It can answer your questions or write essays.

2. **DALL·E**: Creates images from text descriptions.

You say "a cat wearing a hat," and it generates that image.

3. **Deepfakes**: Alters videos by swapping faces or voices.

It can make it look like someone said something they didn't.

4. **Runway**: AI for editing and creating videos.

You describe a scene, and it adds it to your video.

AI Domains

- Robotics
- Autonomous systems
- Expert systems
- Deep learning

and many more….

Thank you