Lab 1: Introduction to Chatgpt

introduction
ChatGPT is an advanced AI language model developed by OpenAI, based on the transformer architecture. It is designed to understand and generate human-like text, enabling interactive conversations, content creation, and problem-solving across various domains.

How ChatGPT Works
At its core, ChatGPT uses a deep learning model called a transformer. This architecture relies heavily on a mechanism called *self-attention*, which allows the model to weigh the importance of different words in a sentence relative to each other. This enables ChatGPT to understand context and generate coherent, relevant responses

Real-World Applications:

- Customer support chatbots.

- Virtual personal assistants.

- Content creation (blogs, marketing copy, scripts).

- Education and tutoring.

- Coding help and debugging.

- Language translation and communication aids.

Real-World Examples

1. **Education:**
   ChatGPT acts as a virtual tutor, helping students by answering questions, explaining complex concepts, and providing feedback on essays or homework. For example, a student struggling with math can ask ChatGPT to explain algebraic equations step-by-step.

2. **Healthcare:**
   It assists in providing medical information, symptom checking, and patient education. While not a replacement for professional advice, ChatGPT can help users understand

general health topics or prepare questions for doctors.

3. **Business:**
   Many companies use ChatGPT for customer support chatbots that handle common queries instantly, freeing human agents for complex cases. It also helps create marketing content, draft emails, and analyze data insights.

4. **Creativity:**
   Writers, artists, and game designers use ChatGPT to brainstorm ideas, generate story plots, create character dialogues, or even write poetry and lyrics, enhancing creative workflows.

Conclusion
ChatGPT leverages cutting-edge AI technology to provide versatile language understanding and generation capabilities. Its impact spans education, healthcare, business, and creative industries, improving productivity and accessibility to information. However, it is important to use ChatGPT thoughtfully, recognizing its limitations, such as occasional inaccuracies or lack of true understanding.

Lab2: Understanding Types of Prompts in ChatGPT

Objective

Learn about different types of prompts—**instructional**, **interrogative**, **zero-shot**, and **few-shot**—and how prompt design affects the AI's responses.

Types of Prompts

1. **Instructional Prompts**
   These give clear instructions to the model about what to do.
   Example: "Write a summary of the plot of *Romeo and Juliet*."

2. **Interrogative Prompts**
   These are questions seeking information or explanations.
   Example: "What are the main themes in *Romeo and Juliet*?"

3. **Zero-shot Prompts**
   The model is asked to perform a task without any examples or prior context.
   Example: "Translate the following English sentence into French: 'Good morning.'"

4. **Few-shot Prompts**
   The model is given a few examples before being asked to perform the same or similar task.

Output: 5 Examples of Each Prompt Type with Comparison -

Instructional Prompts (Examples)

1. Write a poem about autumn.

2. Summarize the causes of World War II.

3. Generate a recipe for chocolate chip cookies.

4. Explain how photosynthesis works.

5. Create a workout plan for beginners.

Interrogative Prompts (Examples)

1. What is the capital of Japan?

2. How does the human heart function?

3. Why do leaves change color in fall?

4. Who wrote *1984*?

5. What are the benefits of exercise?

Zero-shot Prompts (Examples)

1. Translate "Hello" to Spanish.

2. Convert 10 miles to kilometers.

3. Write a haiku about the ocean.

4. Generate a list of synonyms for "happy."

5. Explain the theory of relativity.

Few-shot Prompts (Examples)

1. Example: English: "Hello" → Spanish: "Hola"
   Translate "Goodbye" to Spanish.

2. Example: Convert 5 miles to kilometers → 8.05 km
   Convert 12 miles to kilometers.

3. Example: Haiku about spring: *Blossoms in the breeze*
   Write a haiku about winter.

4. Example: Synonyms for "sad": unhappy, sorrowful, downcast
   List synonyms for "angry."

5. Example: Explanation of gravity: Force pulling objects together
   Explain magnetism.

Comparison Summary

- **Zero-shot** prompts rely entirely on the model's prior training and often produce good results for simple tasks.

- **Few-shot** prompts guide the model with examples, often improving accuracy and format, especially for complex or less common tasks.

- **Instructional** prompts clearly define what to do, useful for creative or specific tasks.

- **Interrogative** prompts ask direct questions and are effective for fact-based querie

Lab 3: Precision Prompting for Information Extraction

Objective

Extract structured data from ChatGPT responses by prompting for specific formats like JSON or tables.

Prompt

Extract and format the following information from this paragraph into JSON:

- Name

- Contact Info (email, phone)

- Education

- Experience

- Skills/Keywords

Paragraph:
 "Emily Johnson is a project manager skilled in Agile methodologies, risk management, and team leadership. She earned her PMP certification and a Bachelor's degree in Business Administration from UCLA. You can contact her at emily.johnson@example.com or call +15551234567. She has 7 years of experience managing projects at Microsoft."

Sample Output (JSON)

```
{
  "Name": "John Doe",
```

"Contact_Info": {

  "Email": "john.doe@example.com",

  "Phone": "+1234567890"

},

"Education": "Bachelor's degree in Computer Science from MIT",

"Experience": "5 years at Google as a backend developer",

"Skills_Keywords": ["Python", "Java", "machine learning", "backend development"]

}

Output Accuracy and Format

- **Accuracy:**

  - Correctly identified all requested fields.

  - Contact information is precise and complete.

  - Education and experience details fully captured.

  - Skills/keywords reflect both explicit and contextual data.

- **Format:**

  - JSON format is clean, properly structured, and easily machine-readable.

  - Keys clearly label the information for straightforward extraction.

Lab 4: Summarization and Text Transformation

Example 1: Summarization Original Research Abstract: "Artificial Intelligence (AI) technologies are transforming healthcare by improving diagnostic accuracy, personalizing treatment, and optimizing operational efficiency. Recent AI models have demonstrated capabilities to predict diseases earlier than traditional methods."

ChatGPT Summary:
AI is revolutionizing healthcare by enhancing diagnosis, personalizing treatment, and improving efficiency, with new models predicting diseases earlier than before.

Example 2: Tone Transformation (Email Rewriting)

Original Email (Informal):
"Hi Alex,
Can you send me the latest sales report? Need it ASAP. Thanks!"

Rewritten Email (Formal):
"Dear Alex,
Could you please provide me with the latest sales report at your earliest convenience? Thank you."

✅ **Original Text (Research Abstract): -**"Artificial Intelligence (AI) technologies are transforming healthcare by improving diagnostic accuracy, personalizing treatment, and optimizing operational efficiency. Recent AI models have demonstrated capabilities to predict diseases earlier than traditional methods."

✅ **ChatGPT Summary:-** AI is revolutionizing healthcare by enhancing diagnosis, personalizing treatment, and improving efficiency, with new models predicting diseases earlier than before.

✅ **Accuracy & Format Evaluation:**

- The summary is **clear**, **concise**, and retains all key points.
- Well-structured for professional or academic use.
- Complex ideas were simplified without losing meaning.

Lab 5: ChatGPT in Code Generation and Debugging

✅ Activity 1: Code Generation from Prompt

Prompt:
 "Write a Python program to check whether a number is prime."

ChatGPT-Generated Code:

```python
def is_prime(n):

    if n <= 1:

        return False

    for i in range(2, int(n ** 0.5) + 1):

        if n % i == 0:

            return False

    return True



# Example usage

num = int(input("Enter a number: "))

if is_prime(num):

    print(f"{num} is a prime number.")
```

else:

   print(f"{num} is not a prime number.")

Activity 2: Debugging Code Snippet

Given Buggy Code (Python):

```python
def add_numbers(a, b)

    result = a + b

    return result
```

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n the code generation task, ChatGPT was asked to write a Python program that checks whether a number is prime. The model generated a correct and efficient function using standard logic, including a square root optimization for performance. When tested with the input 7, the output was: *"7 is a prime number."* — which matched the expected result. The code was clean, error-free, and ready to use.

In the debugging task, a faulty Python function was provided that had a missing colon (`:`) in the function definition. ChatGPT quickly identified the syntax error and corrected it. After fixing, the function `add_numbers(3, 5)` returned the expected result 8, demonstrating that the model not only understood the error but also provided a working solution.

Overall, ChatGPT's output in both code generation and debugging tasks matched the expected outputs exactly. It demonstrated the ability to write correct logic, follow standard syntax, and provide useful fixes. This confirms that ChatGPT is an effective tool for supporting programming **and debugging activities.**

Lab 6: Domain-Specific Applications

Option 1: Medical Chatbot Simulation

Prompt Design

"Simulate a conversation where a patient describes symptoms of a common cold, and the chatbot provides advice on treatment and when to see a doctor."

Sample Output (Excerpt)

Patient: I have a sore throat, runny nose, and mild fever. What should I do?
 Chatbot: These symptoms sound like a common cold. Rest, stay hydrated, and use over-the-counter medicines for relief. If your fever lasts more than 3 days or symptoms worsen, please consult a healthcare professional.

Output Evaluation

- Relevance: Chatbot response matches symptoms described.

- Accuracy: Provides medically appropriate advice for common cold.

- Tone: Friendly and reassuring, suitable for patient communication.

- Clarity: Easy to understand and actionable.