Lab 1: Introduction to ChatGPT

ChatGPT: Working and Real-World Applications

Overview:

ChatGPT, developed by **OpenAI**, is an advanced AI chatbot based on the **GPT** (**Generative Pre-trained Transformer**) architecture. It is designed to understand and generate human-like text using deep learning techniques.

How ChatGPT Works:

• Architecture:

Built on the **transformer model**, it uses attention mechanisms to understand word relationships and context. It processes input text as **tokens** and predicts likely word sequences.

Training Process:

- 1. **Pre-training:** Learned from large datasets like books, websites, and articles.
- 2. Fine-tuning: Improved using Reinforcement Learning with Human Feedback (RLHF) for safer and more accurate responses.

• Function:

When users type a question, ChatGPT processes the input, analyzes patterns, and generates relevant answers using its trained neural network.

Real-World Applications:

• Education:

- Virtual tutor for explaining concepts and solving problems.
- Helps with writing, summarizing, and coding assistance.

• Healthcare:

- o Mental health chatbots (e.g., Woebot).
- o Provides basic health info and symptom explanations.

Business:

- Automates customer support and email replies.
- o Generates reports, ads, and product descriptions.

Creativity:

- o Assists in story writing, idea generation, and design concepts.
- Supports music, scriptwriting, and visual art prompts.

Conclusion:

ChatGPT combines deep learning with real-world usability. It enhances productivity, learning, creativity, and decision-making across industries, making it one of the most impactful AI tools today.

Lab 2: Types of Prompts and Prompt Engineering Basics

Types of Prompts and Prompt Engineering Basics

Objective Understand and apply different types of prompts (instructional, interrogative, zero-shot, few-shot) and compare results.

Instructional Prompts

Prompts that give direct instructions.

- 1. Summarize the causes of World War I.
- 2. Write a thank-you email to a teacher.
- 3. Convert "She wrote the book" into passive voice.
- 4. Create a Python function to reverse a string.
- 5. Explain the water cycle for a 5th grader.

Result: Clear and direct outputs. Best for controlled tasks.

Interrogative Prompts

Question-based prompts.

- 1. What are the benefits of exercise?
- 2. How does a transformer model work?
- 3. Why do leaves change color in autumn?

- 4. Who discovered penicillin?
- 5. Which country has the longest coastline?

Result: Great for factual or explanatory answers.

Zero-shot Prompts

No examples given.

- 1. Translate "Good morning" to French.
- 2. Write a slogan for a pizza shop.
- 3. Summarize: "AI is transforming industries..."
- 4. Create a tagline for a tech startup.
- 5. Classify: "The product was amazing!" Positive or Negative?

Result: Fast responses, but sometimes less accurate.

Few-shot Prompts

Provide examples to guide AI.

- 1. Hello = Hola, Goodbye = Adiós → Thank you = ?
- 2. "I love this!" = Positive → "It's okay." = ?
- 3. Joke: Why did the chicken cross the road? → Generate similar.
- 4. Text1 → summary1, Text2 → summary2, Text3 → ?
- 5. This is a test \rightarrow This is a test \rightarrow I hav no ideaa = ?

Result: Most accurate. Learn from patterns.

Comparison Summary

Prompt Type Strengths Use Case

Instructional Precise, clear Tasks with defined output

Interrogative Natural, informative Factual answers

Zero-shot Quick, flexible Simple tasks

Pattern-based tasks Few-shot Highly accurate

Lab 3: Precision Prompting for Information Extraction

Objective: Extract structured data from ChatGPT responses using formatting techniques like JSON and tables.

Activities:

- Use prompts that instruct ChatGPT to return data in JSON or tabular format.
- Extract data such as contact info, resume sections, and keywords from raw text.

Prompt Example:

"Extract name, email, and skills from this resume paragraph. Format output in JSON."

Input Text:

"Abheejit Sharma is a data analyst with experience in Python, SQL, and data visualization. You can reach her at Abheejit.sharma@email.com."

Output:

```
{
    "name": "Abheejit Sharma",
    "email": "Abheejit.sharma@email.com",
    "skills": ["Python", "SQL", "Data Visualization"]
}
```

Accuracy & Format Evaluation:

- Accuracy: 100% for clean inputs.
- JSON format: Ideal for structured storage and automation.
- Tables are also effective for visual clarity in reports.

Lab 4: Summarization and Text Transformation

Objective: Use ChatGPT for summarizing content and changing tone or format.

Activities:

- Summarize news articles or abstracts.
- Rephrase emails in formal or informal tone.

Task 1: Summarization

Input:

"India launched a national digital health initiative to digitize health records and improve access to healthcare."

Output Summary:

"India introduces a digital health mission to enhance healthcare accessibility."

Task 2: Tone Transformation

Original Email (Informal):

"Hey! Just reminding you to send the report by tonight."

Formal Version:

"Dear Sir/Madam, Kindly submit the report by the end of the day."

Evaluation:

- Summarization is concise and retains key info.
- Tone transformation shows strong control over style and context.

Lab 5: ChatGPT in Code Generation and Debugging

Objective: Explore ChatGPT's capabilities in writing and fixing code.

Activities:

- Generate programs using natural language prompts.
- Debug existing code snippets.

Prompt 1: Code Generation

"Write a Python program to check if a number is prime."

Output:

```
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</pre>
```

Prompt 2: Debugging "Fix this C++ code: for(i=0; i<n; i++) sum+=i"

Fixed Code:

```
int sum = 0;
for(int i = 0; i < n; i++) {
    sum += i;
}
```

Evaluation:

- Code generated was accurate and efficient.
- Debugging identified syntax and logic errors correctly.

Lab 6: Domain-Specific Application

Objective: Apply ChatGPT to a specific domain task.

Chosen Task: Educational Quiz Generation

Activities:

Design a prompt to generate MCQs for a selected grade and subject.

Prompt:

"Generate 5 multiple choice questions for 8th-grade science with 4 options and answers."

Sample Output:

- 1. What is the powerhouse of the cell?
 - A. Nucleus
 - B. Mitochondria 🗸
 - C. Ribosome
 - D. Chloroplast
- 2. What gas do plants take in during photosynthesis?
 - A. Oxygen
 - B. Nitrogen
 - C. Carbon Dioxide 🗸
 - D. Hydrogen
- 3. Which part of the plant conducts photosynthesis?
 - A. Root
 - B. Stem
 - C. Leaf 🗸
 - D. Flower

Evaluation:

- Age-appropriate and scientifically accurate.
- Format is ready for direct use in tests or worksheets.

Conclusion:

Labs 3–6 demonstrate ChatGPT's practical applications beyond conversation. Whether extracting structured data, transforming tone, writing/debugging code, or creating educational material, precision in prompt design leads to high-quality results.