

## PRACTICAL No. 03

### Lab 1: Introduction to ChatGPT

#### ❖ Objective:

To understand the basics of ChatGPT, including its origin, underlying technology, capabilities, and applications in real-world fields such as education, healthcare, business, and creative industries.

#### ❖ What is ChatGPT?

ChatGPT is an AI-based chatbot developed by OpenAI, based on the Generative Pre-trained Transformer (GPT) architecture. It is designed to understand natural language and generate human-like responses. The model was first introduced with GPT-1 and has since evolved through multiple versions (GPT-2, GPT-3, GPT-4), becoming more powerful and capable with each iteration.

#### ❖ How ChatGPT Works

ChatGPT is powered by a **transformer neural network**, a deep learning model that uses mechanisms like **self-attention** to understand the relationship between words in a sentence. The model is trained on large datasets from books, articles, websites, and conversations to learn grammar, facts, reasoning, and context.

It operates in two main phases:

- **Pre-training:** The model learns general language patterns by predicting the next word in a sentence.
- **Fine-tuning:** The model is adjusted using specific datasets and user feedback (like Reinforcement Learning from Human Feedback - RLHF) to improve accuracy, relevance, and safety.

Visualization tools like **TransformerLens** or **Google's TensorBoard** can help users explore how the model processes and attends to words in a sentence.

## ❖ Real-World Applications of ChatGPT

### 1. Education:

- Acts as a virtual tutor for subjects like math, science, and languages.
- Assists with writing, summarizing, and language translation.
- Supports personalized learning experiences.

### 2. Healthcare:

- Provides mental health support via AI chatbots (e.g., Woebot, Wysa).
- Helps doctors and researchers summarize medical literature and case studies.
- Aids in patient engagement and medical FAQs.

### 3. Business:

- Automates customer support and service chatbots.
- Drafts business emails, reports, and meeting summaries.
- Supports marketing through content generation and product descriptions.

### 4. Creativity:

- Generates story ideas, poems, and dialogues.
- Assists in scriptwriting, songwriting, and brainstorming visual art prompts.
- Aids game designers in creating characters and narratives.

## ❖ Conclusion

ChatGPT is a powerful example of how artificial intelligence can enhance productivity, creativity, and accessibility across many fields. Its foundation in transformer architecture enables it to understand and generate language in a way that closely mimics human communication. As the technology advances, its potential applications will continue to expand across industries.

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## **Lab 2: Types of Prompts and Prompt Engineering Basics**

### **❖ Objective:**

Learn about different types of prompts — instructional, interrogative, zero-shot, and few-shot — and explore how prompt engineering improves AI responses.

### **❖ What is a Prompt?**

A prompt is the input or instruction given to an AI language model like ChatGPT. It can be as simple as a question or as complex as a scenario with specific requirements.

### **❖ What is Prompt Engineering?**

Prompt engineering is designing prompts carefully to get accurate, relevant, and useful responses. Techniques include:

- Providing context
- Giving clear instructions
- Using examples (few-shot prompting)
- Formatting responses (JSON, tables, bullet points)
- Asking for step-by-step reasoning

### **❖ 5 examples of each prompt type**

#### **1. Instructional Prompts (Commands/Requests)**

1. Explain how photosynthesis works.
2. List five benefits of drinking water.
3. Write a polite email requesting a meeting.
4. Create a daily workout plan for beginners.
5. Summarize the plot of “The Lion King”.

#### **2. Interrogative Prompts (Questions)**

1. What causes thunderstorms?
2. Who discovered penicillin?
3. How does a computer process data?
4. Where is Mount Everest located?
5. Why do birds migrate?

### **3. Zero-shot Prompts (No examples given)**

1. Translate “Hello, how are you?” into French.
2. Write a poem about the sea.
3. Describe the process of evaporation in two sentences.
4. List three popular programming languages.
5. Explain the importance of recycling.

### **4. Few-shot Prompts (Given examples before task)**

Example prompt for language translation:

- Translate “Good morning” to Spanish: Buenos días
- Translate “Thank you” to Spanish: Gracias
- Translate “Please” to Spanish:

Example prompt for math:

- $2 + 2 = 4$
- $3 + 5 = 8$
- $7 + 6 = 13$

### **❖ Conclusion:**

Effective prompt engineering improves AI output quality. Few-shot prompts usually yield the best results due to guiding examples, while zero-shot prompts are useful for quick, flexible answers. Instructional and interrogative prompts work well for clear commands and questions.

## Lab 3: Precision Prompting for Information Extraction

### ❖ Objective:

Learn to extract structured data from ChatGPT responses by using precision prompting techniques such as requesting JSON or tabular formats.

### ❖ Activities and Examples

#### 1. Extract Contact Info in JSON

*Prompt:* Extract contact details from the text and format as JSON.

**Example Output:**

```
{  
  "name": "John Doe",  
  "email": "john.doe@example.com",  
  "phone": "(555) 123-4567",  
  "location": "New York"  
}
```

### ❖ Output Accuracy and Format

- Clear, precise prompting results in accurate extraction of data.
- JSON formatting is effective for nested or structured data.
- Tabular format enhances readability for lists and records.
- These techniques help automate data handling and improve response usability.

#### 2. List Resume Sections in a Table

*Prompt:* Identify resume sections from the paragraph and list in a table.

**Example Output:**

Section
Education

Work Experience

Skills

Certifications

### 3. Extract Keywords List

*Prompt:* Extract 5 keywords from a paragraph on renewable energy.

*Example Output:*

Renewable energy, solar, wind, hydroelectric power, carbon emissions

### 4. Extract Product Details in JSON

*Prompt:* Extract product name, price, and features from product description.

**Example Output:**

```
{  
  
  "product_name": "SmartWatch X",  
  
  "price": "$199",  
  
  "features": [  
  
    "1.5-inch display",  
  
    "heart rate monitoring",  
  
    "battery life of 24 hours"  
  
  ]  
  
}
```

### 5. Extract Event Details in a Table

*Prompt:* Extract event name, date, time, and location; format as table.

**Example Output:**

Event Name	Date	Time	Location
==AI Conference	August 15, 2025	9 AM - 5 PM	Downtown Convention Center

#### ❖ Conclusion:

Precision prompting with instructions to output JSON or tables significantly improves the quality and usability of information extracted from ChatGPT. This approach is essential for structured data extraction tasks in real-world applications.

## Lab 4: Summarization and Text Transformation

#### ❖ Objective:

Use ChatGPT to summarize texts, rewrite content, and change tone effectively

#### Activities:

- Summarize news articles or research abstracts
- Rewrite emails in formal and informal tones

Task	Original Text	ChatGPT Output
Summarization	<i>"Global warming is accelerating due to increased greenhouse gas emissions from human activities."</i>	<i>"Human activities are causing faster global warming by increasing greenhouse gases."</i>
Summarization	<i>"A new study shows that meditation can reduce stress and improve mental health."</i>	<i>"Meditation helps lower stress and boost mental well-being, according to new research."</i>
Formal Email Rewrite	<i>"Hey Mike, can you send me the presentation slides by tomorrow? Thanks!"</i>	<i>"Dear Mike, Could you please send me the presentation slides by tomorrow? Thank you."</i>
Informal Email Rewrite	<i>"Dear Ms. Johnson, I would like to schedule a meeting to discuss the project updates."</i>	<i>"Hi Ms. Johnson, I'd like to set up a meeting to talk about the project updates."</i>
Formal Email Rewrite	<i>"Can you review the report and provide feedback?"</i>	<i>"Please review the report and kindly provide your feedback."</i>

## Conclusion

ChatGPT accurately summarizes long texts while keeping key information. It rewrites content in both formal and informal tones as needed. This improves clarity and adaptability in communication tasks.



## Lab 5: ChatGPT in Code Generation and Debugging

### ❖ Objective:

Explore how ChatGPT can assist in writing and debugging code in languages like Python, C++, and Java.

### ❖ Activities:

#### 1. Code Generation:

Prompt ChatGPT to generate code for a given task.

#### 2. Code Debugging:

Provide a faulty code snippet and ask ChatGPT to identify and fix the error.

### ❖ Comparison Table: ChatGPT Code vs Expected Output

Language	Task	ChatGPT Code Summary	Expected Output	Matches?
Python	Check if a number is prime	Used loop + square root optimization in <code>is_prime()</code> function	<code>True</code> for input 17	✔Yes
C++	Fix factorial code	Corrected base case from <code>return 0;</code> to <code>return 1;</code> in recursion	120 for input 5	✔Yes

Java	Reverse a string	Used <code>StringBuilder.reverse()</code> to reverse the string	Input: "hello" → olleh	✓Yes
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## Conclusion:

ChatGPT successfully generated and debugged code in Python, C++, and Java. All outputs matched the expected results, proving ChatGPT's usefulness in coding tasks and error correction.

## Lab 6: Domain-Specific Applications

### ❖ Objective:

Explore how ChatGPT can be applied to specific domains through task-based interactions.

### Activities (Choose one):

- Medical Chatbot Simulation
- Legal Document Summarization
- Educational Quiz Generation

### ❖ Selected Activity: Medical Chatbot Simulation

#### ❖ Prompt Design

- Objective: Provide a simple and clear explanation of common cold symptoms and home remedies.
- Prompt Example:  
"As a medical chatbot, explain common cold symptoms and suggest home remedies in simple language."

- Design Considerations: Use non-technical, patient-friendly terms; focus on actionable advice.

### ❖ ChatGPT Output

“Common cold symptoms include runny nose, cough, sore throat, and mild fever. Rest, stay hydrated, use saline sprays, and take over-the-counter painkillers to feel better.”

### Output Evaluation

- Accuracy: Correct identification of symptoms and remedies.
- Clarity: Easy to understand, suitable for general users.
- Completeness: Covers main symptoms and care; lacks guidance on when to seek medical help.
- Tone & Style: Friendly and supportive tone appropriate for patients.
- Limitations: Could improve by adding warning signs and doctor consultation advice.

### ❖ Conclusion

The prompt was effective in generating clear, relevant medical advice. Fine-tuning prompt details can improve completeness and safety-related guidance, enhancing ChatGPT's usefulness in medical simulations.