Tab 1

# **Lab 1: Introduction to ChatGPT**

Objective:  
 To understand the basics of ChatGPT, its origin, how it works, and its real-world application

### What is ChatGPT?

ChatGPT is an advanced conversational AI model developed by OpenAI. It is based on the GPT (Generative Pre-trained Transformer) architecture, designed to understand and generate human-like text. ChatGPT can carry on conversations, answer questions, generate creative content, and assist in various language-based tasks.

Real-World Applications

* Education: Acts as a personalized tutor, explains complex topics, helps with language learning, and provides writing assistance.
* Healthcare: Assists in patient education, symptom checking (not a replacement for doctors), and helps medical professionals with documentation.

Exploring the Interface & Visualization Tools

Users interact with ChatGPT through a simple text interface where they input prompts and receive instant responses. To understand the model better, visualization tools of the **transformer architecture (like** self-attention maps) help illustrate how the model “pays attention” to different parts of the input text.

Summary:  
 ChatGPT is a powerful AI language model that leverages transformer technology to understand and generate human-like text. Its flexible capabilities enable it to assist across diverse domains, from education to business, making it a valuable tool in the digital age.

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

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

### **What is a Prompt?**

A **prompt** is the input or instruction given to an AI model like ChatGPT to generate a relevant output. Prompts range from simple questions to detailed instructions with examples or constraints.

**Prompt Engineering** is designing prompts effectively by:

* Providing context
* Giving clear instructions
* Using examples (few-shot)
* Formatting outputs (JSON, tables)
* Requesting step-by-step reasoning

**Types of Prompts with Examples**

**1. Instructional Prompts**

Direct commands or requests to perform a task.

| **Example #** | **Prompt** |
| --- | --- |
| 1 | “List 3 benefits of electric vehicles.” |
| 2 | “Explain how photosynthesis works.” |
| 3 | “Write a short poem about summer.” |
| 4 | “Generate a to-do list for a student.” |
| 5 | “Summarize the causes of World War II.” |

#### **2. Interrogative Prompts**

Questions designed to elicit information.

| **Example #** | **Prompt** |
| --- | --- |
| 1 | “What is the capital of France?” |
| 2 | “How does the human heart function?” |
| 3 | “Why is the sky blue?” |
| 4 | “When was the first moon landing?” |
| 5 | “Who invented the telephone?” |

#### **3. Zero-shot Prompts**

The model receives a request without any example and must generate a response based only on instructions.

| **Example #** | **Prompt** |
| --- | --- |
| 1 | “Translate ‘Hello’ to Spanish.” |
| 2 | “Generate a recipe for a chocolate cake.” |
| 3 | “Explain blockchain technology.” |
| 4 | “Provide 5 tips for improving concentration.” |
| 5 | “Describe the process of making coffee.” |

#### **4. Few-shot Prompts**

The prompt provides examples before the main task, helping the model learn the expected format or style.

| **Example #** | **Prompt (with examples)** |
| --- | --- |
| 1 | “Q: What is AI? A: AI stands for Artificial Intelligence. It involves machines that can think and learn. Now, Q: What is VR? A:” |
| 2 | “Translate these words to French: Cat -> Chat, Dog -> Chien, House -> Maison, Car -> Voiture, Book ->” |
| 3 | “Summarize the sentences: 1) The sun is hot. The sun produces light and heat. Summary: The sun gives heat and light. 2) The cat sleeps all day. The cat likes naps. Summary:” |
| 4 | “Convert temperatures: 0°C = 32°F, 10°C = 50°F, 20°C = 68°F, 30°C =” |
| 5 | “Q: Who wrote ‘1984’? A: George Orwell. Q: Who painted the Mona Lisa? A:” |

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### **Comparison of Results**

| **Prompt Type** | **Strengths** | **Challenges** |
| --- | --- | --- |
| Instructional | Clear and direct answers; good for tasks | May require detailed instructions for complex tasks |
| Interrogative | Good for factual questions | Model may provide vague or incomplete answers if context is missing |
| Zero-shot | Fast and flexible; no prep needed | Responses can be inconsistent or less precise without examples |
| Few-shot | More accurate and consistent; guides style | Requires effort to craft good examples; longer prompts |

### **Conclusion**

Prompt engineering helps maximize ChatGPT’s accuracy and usefulness. Using context, clear instructions, and examples (few-shot) generally produces the best outputs, especially for complex tasks. Experimenting with different prompt types is essential to understand how to communicate effectively with AI.

# **Lab 3: Precision Prompting for Information Extraction**

**Objective:** Learn to design precise prompts that extract structured data from ChatGPT responses, formatted as JSON or tables.

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### **Activities and Example Prompts**

#### **1. Formatting response in JSON**

**Prompt:** *“Extract the contact information (name, phone number, email) from the following paragraph and format the response as JSON:* ‘John Doe can be reached at (555) 123-4567 or john.doe@example.com.’”

**Output:**

{

"name": "John Doe",

"phone": "(555) 123-4567",

"email": "john.doe@example.com"

}

#### **2. Formatting response in Table**

**Prompt:** *“From the following paragraph, extract the education, work experience, and skills sections and present them in a table format:* ‘Jane Smith graduated from MIT with a degree in Computer Science. She worked as a software engineer at Google for 3 years. Skills include Python, Java, and machine learning.’”

**Output:**

| **Section** | **Details** |
| --- | --- |
| Education | Graduated from MIT with a degree in Computer Science |
| Work Experience | Software engineer at Google for 3 years |
| Skills | Python, Java, machine learning |

#### **3. Extracting Keywords from Text**

**Prompt:** *“Extract 5 main keywords from this paragraph:* ‘Artificial Intelligence is transforming industries by enabling automation, enhancing decision-making, and improving customer experiences.’”

**Output:**

* Artificial Intelligence
* Automation
* Decision-making
* Customer experiences
* Industries

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### **Output Accuracy and Format Evaluation**

| **Prompt #** | **Output Format** | **Accuracy** | **Comments** |
| --- | --- | --- | --- |
| 1 | JSON | Highly accurate | All required fields correctly extracted |
| 2 | Table | Accurate | Information correctly categorized and formatted |
| 3 | List | Accurate | Keywords relevant and well identified |

### **Summary:**

Using precision prompting, ChatGPT effectively extracts structured data when asked with clear instructions to provide outputs in JSON or table format. This technique is valuable for automating data extraction tasks such as processing resumes, contact information, or summarizing key points from large texts.

# **Lab 4: Summarization and Text Transformation**

**Objective:** Use ChatGPT to summarize texts and rewrite emails by changing tone.

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### **Activity 1: Summarize News Article**

**Original Text:** *"Scientists have discovered a new species of frog in the Amazon rainforest. This frog has unique color patterns and can survive in extreme environmental conditions. The discovery highlights the rich biodiversity of the Amazon and the importance of conservation efforts."*

**ChatGPT Summary:** Scientists found a new frog species in the Amazon with unique colors and high environmental resilience, emphasizing the region’s biodiversity and conservation needs.

### **Activity 2: Summarize Research Abstract**

**Original Text:** *"This study analyzes the effects of urban air pollution on respiratory health over a 10-year period. Data from multiple cities shows a significant increase in asthma cases linked to rising pollution levels. Recommendations include stricter emission controls and public health interventions."*

**ChatGPT Summary:** The study links rising urban air pollution to increased asthma cases over 10 years and suggests stricter emissions controls and health measures.

### **Activity 3: Email Rewriting — Formal Tone**

**Original Email (Informal):** *"Hey John,  
 Can you send me the report by tomorrow? Need it for the meeting. Thanks!"*

**ChatGPT Formal Version:** Dear John,  
 Could you please send me the report by tomorrow? I require it for the upcoming meeting. Thank you.

### **Activity 4: Email Rewriting — Informal Tone**

**Original Email (Formal):** *"Dear Sarah,  
 I would like to schedule a meeting to discuss the project updates. Please let me know your availability. Best regards."*

**ChatGPT Informal Version:** Hi Sarah,  
 Let’s set up a meeting to talk about the project updates. When are you free? Cheers.

# **Summary and Transformation Report**

| **Task** | **Original Text Type** | **ChatGPT Output Type** | **Comments** |
| --- | --- | --- | --- |
| Summarization (News) | Paragraph | Concise summary | Captured key points clearly |
| Summarization (Research) | Abstract | Brief summary | Maintained essential info |
| Tone Change (Formal) | Informal email | Formal email | Polite and professional style |
| Tone Change (Informal) | Formal email | Informal email | Friendly and casual tone |

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# **Lab 5: ChatGPT in Code Generation and Debugging**

**Objective:** Explore how ChatGPT can assist in generating and debugging code in different programming languages.

### **Activity 1: Code Generation from Prompt**

**Prompt:** “Write a Python function that takes a list of numbers and returns the sum of all even numbers.”

**ChatGPT Generated Code:**

**// python:**

def sum\_even\_numbers(numbers):

total = 0

for num in numbers:

if num % 2 == 0:

total += num

return total

**Expected Output:**

For input [1, 2, 3, 4, 5, 6], output should be 12 (2 + 4 + 6).

**Test:**

print(sum\_even\_numbers([1, 2, 3, 4, 5, 6])) # Output: 12

Result: Matches expected output.

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### **Activity 2: Debugging Code Snippet**

**Given Code (contains a bug):**

def multiply\_list(numbers):

result = 1

for num in numbers:

result = result + num # Bug: should multiply, not add

return result

**Prompt:**

“Find and fix the bug in this Python function that multiplies all numbers in a list.”

**ChatGPT Debugged Code:**

def multiply\_list(numbers):

result = 1

for num in numbers:

result = result \* num # Fixed: multiplication instead of addition

return result

**Expected Output:**

For input [2, 3, 4], output should be 24 (2 \* 3 \* 4).

**Test:**

print(multiply\_list([2, 3, 4])) # Output: 24

Result: Corrected code works as expected.

### **Activity 3: Java Code Generation**

**Prompt:** “Write a Java method to check if a string is a palindrome.”

**ChatGPT Generated Code:**

public boolean isPalindrome(String str) {

int left = 0, right = str.length() - 1;

while (left < right) {

if (str.charAt(left) != str.charAt(right)) {

return false;

}

left++;

right--;

}

return true;

}

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### **Summary and Comparison**

| Task | Language | ChatGPT Output | Expected Output | Comments |
| --- | --- | --- | --- | --- |
| Code generation | Python | Function sums even numbers | Correct result for test input | Accurate and efficient |
| Debugging | Python | Fixed addition to multiplication | Correct multiplication result | Bug correctly identified and fixed |
| Code generation | Java | Palindrome checker method | Correct palindrome check | Well-structured and concise |

**Conclusion:**

ChatGPT effectively generates working code snippets and helps debug errors with clear explanations. It is a useful tool for programmers to speed up coding and troubleshooting.

# **Lab 6: Domain-Specific Applications – Educational Quiz Generation**

**Objective:** Use ChatGPT to generate domain-specific content; in this case, create an educational quiz.

### **Task Chosen: Educational Quiz Generation**

### **Prompt Design:**

**Prompt:** “Generate a 5-question multiple-choice quiz on the topic of ‘Photosynthesis’ suitable for high school students. Provide four options for each question and indicate the correct answer.”

### **ChatGPT Output:**

1. **What is the primary pigment involved in photosynthesis?** A) Chlorophyll  
    B) Carotene  
    C) Xanthophyll  
    D) Melanin  
    **Correct Answer:** A
2. **Where in the plant cell does photosynthesis take place?** A) Mitochondria  
    B) Chloroplast  
    C) Nucleus  
    D) Ribosome  
    **Correct Answer:** B
3. **Which gas is absorbed by plants during photosynthesis?** A) Oxygen  
    B) Nitrogen  
    C) Carbon dioxide  
    D) Hydrogen  
    **Correct Answer:** C
4. **What are the main products of photosynthesis?** A) Oxygen and glucose  
    B) Carbon dioxide and water  
    C) Oxygen and water  
    D) Glucose and nitroge

**Correct Answer:** A

5**. Photosynthesis converts light energy into what type of energy?**

A) Mechanical energy

B) Chemical energy

C) Thermal energy

D) Electrical energy

**Correct Answer:** B

### **Output Evaluation:**

| **Criteria** | **Evaluation** |
| --- | --- |
| Content Accuracy | All questions and answers are scientifically accurate and relevant. |
| Clarity | Questions are clear and appropriate for high school level. |
| Format | Well-organized multiple-choice format with correct answers indicated. |
| Usefulness | Can be used directly for quizzes or study material. |

### **Summary:**

ChatGPT successfully generated an accurate and educational quiz on photosynthesis tailored to high school students. The prompt was clear and specific, helping the model produce structured and relevant questions. This demonstrates ChatGPT’s potential for creating domain-specific educational content efficiently.

Tab 2