Introduction to Prompt Engineering.

ZHAW & UZH Digital Sustainable Finance Summer School

David Jaggi[1]

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[1]david.jaggi@zhaw.ch

Motivation

- Large Language Models (LLMs) are powerful tools for analysis, content creation, and problem-solving in finance.
- The quality of their output is directly dependent on the quality of our input.
- Mastering "prompt engineering" allows us to unlock the full potential of these models for complex domains like digital sustainable finance.
- Think of it as learning to communicate effectively with a highly skilled, but very literal, financial analyst.

Key Takeaways for Today

1. Understand what a prompt is and how it influences an AI's response.
2. Learn the key components of a well-structured prompt.
3. Be able to construct and refine basic prompts for better results in sustainable finance.

What is a Large Language Model (LLM)?

Analogy: The Skilled Financial Analyst

Think of an LLM as an incredibly knowledgeable and skilled financial analyst. It has access to vast market data and reports but needs **very specific instructions** to perform a task correctly. It doesn't "know" what you want; it can only interpret what you *say*.

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The instructions we give this analyst are called **prompts**.

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  -> Gives a focused comparison.
- **Great:** "Explain the difference between green bonds and sustainability-linked bonds to a first-year finance student, using an analogy of funding a community garden."
  -> Gives a creative, targeted, and easy-to-understand explanation.

Influence: Garbage In, Garbage Out

The Core Principle

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Specificity Matters

- **Vague Prompt:** "Write about ESG."
- **Result:** A generic overview of Environmental, Social, and Governance factors.
- **Specific Prompt:** "Write a 150-word summary explaining the 'E', 'S', and 'G' pillars of ESG investing for a retail investor's blog."
- **Result:** A highly specific, targeted summary that matches the user's intended audience and format.

The Core Components of a Prompt

A great prompt often includes a combination of these four elements:

1. **Role:** Assign a persona to the AI. This sets the context for its tone and knowledge base.
2. **Task:** The specific action you want the AI to perform.
3. **Context:** Background information, constraints, and details needed to complete the task.
4. **Format:** The desired structure of the output (e.g., list, table, JSON, paragraph).

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Example Breakdown

"As a **sustainable finance analyst (Role)**, identify **three key risks for a fintech company developing a carbon footprint tracking app (Task)**. Consider **regulatory changes, data accuracy, and user adoption challenges (Context)**. Format the output as a **bulleted list with a brief explanation for each risk (Format)**."

Exploring Different Types of Prompts

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Chain-of-Thought (CoT) Prompting

Asking the model to "think step-by-step" to break down complex problems.
Example: "A green fund invests $10M... What is the CO2 reduction per million dollars invested? Let's think step by step."

Live Exercise: From Bad to Good

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Live Exercise: From Bad to Good

Goal: Draft a proposal for a new sustainable investment product.

- **Iteration 1 (Bad):** "Write about a green fund."
- **Iteration 2 (Better):** "Draft a proposal for a new investment fund focused on sustainable technology."
- **Iteration 3 (Great):** "Act as a product manager at a digital investment bank. Draft a one-page concept note for a new ETF named 'Global Clean Water Innovators'. Focus on companies developing water purification technologies. Mention the target audience (millennial and Gen Z investors) and its alignment with UN SDG 6. Keep the tone optimistic."

Iteration: The Prompting Conversation

Your first prompt is rarely your last. Use the AI's response to refine your next prompt.

Example of Iteration

1. **You:** "Analyze this company's sustainability report."
2. **AI:** (Provides a generic summary.)

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1. **You:** "Analyze this company's sustainability report."
2. **AI:** (Provides a generic summary.)
3. **You:** "That's too general. Focus specifically on their carbon emissions data. Is it improving or getting worse over the last three years?"
4. **AI:** (Provides a trend analysis.)

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4. **AI:** (Provides a trend analysis.)
5. **You:** "Okay, the emissions are decreasing. Now, compare their emissions reduction target to the targets set by two of their main competitors."

Using the LLM to Improve Your Prompts

Meta-Prompting

Don't be afraid to ask the model for help! It can be a powerful brainstorming partner for prompt creation.

Example

"I need to write a report on the risks and opportunities of using AI in ESG scoring. Can you suggest 5 effective prompts I could use to get the best results from you for different sections of the report (e.g., introduction, risk analysis, case studies)?"

Final Recap

Key Takeaways

1. Be Specific
2. Provide Context
3. Assign a Role
4. Iterate

Q&A

Use Case: Analysis of Corporate Statements

Project Goal: Use an LLM to extract insights from financial and sustainability reports.

Prompt 1: Greenwashing Detection

"Act as a **critical sustainable finance analyst** specializing in identifying greenwashing.
Analyze the following press release from Company XYZ about their new 'eco-friendly' product line. Identify vague, unsubstantiated, or misleading claims. Highlight any specific phrases that lack credible, verifiable data.
Format your analysis as a bulleted list, quoting the problematic phrase and then providing a brief explanation of why it could be considered greenwashing."

Use Case: Analysis of Corporate Statements

Prompt 2: ESG Risk Identification

"You are an **ESG risk officer** for an institutional investor.
From the provided 'Climate-Related Risks' section of this company's annual report, extract and categorize all mentioned risks into three groups: Physical Risks, Transition Risks, and Litigation Risks.
Provide the output as a **markdown table** with columns for 'Risk Category', 'Risk Summary', and 'Potential Financial Impact'."

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Prompt 3: Sentiment Analysis on an Earnings Call

"As a **quantitative analyst**, perform a sentiment analysis on the CEO's opening remarks from the latest quarterly earnings call transcript provided below.
Classify the overall tone as Optimistic, Neutral, or Cautious regarding the company's sustainability initiatives. **Extract three key phrases** that most strongly support your classification.
Output the result in **JSON format** with keys: 'overall_sentiment', 'confidence_score' (from 0 to 1), and 'supporting_phrases'."

The Landscape 1/3: Foundational Models (The "Engines")

Major Proprietary Models

- **OpenAI:** Creator of the popular **GPT** series (e.g., GPT-4, GPT-5).
- **Google:** Developer of the multimodal **Gemini** family.
- **Anthropic:** Known for its safety-focused **Claude** models.

Key Open Source & Other Models

- **Meta:** Leads the open-source movement with its **Llama** series.
- **Other Innovators:** A vibrant ecosystem including models from **Mistral AI**, **Cohere**, **DeepSeek**, and Alibaba (**QWEN**).

The Landscape 2/3: The Developer Toolkit

Application Frameworks (The "Glue")

- **LangChain & LlamaIndex:** Essential open-source tools for connecting models to data sources and building complex applications (e.g., using RAG).

Core Infrastructure (LLMOps)

A suite of tools for the entire lifecycle:

- **Hubs & Hosting:** Hugging Face is the central repository for the open-source community.
- **Data Management:** Vector Databases (e.g., Pinecone, Milvus) for memory and search.
- **Deployment & Monitoring:** Tools for serving models efficiently and evaluating their performance.

The Landscape 3/3: User-Facing Applications

Conversational AI & Search Interfaces
These are the tools most people interact with directly:

- **ChatGPT** (from OpenAI)
- **Gemini** (from Google, formerly Bard)
- **Claude** (from Anthropic)
- **Perplexity AI** (conversational search)

Specialized Tools with Integrated AI
LLMs are being embedded into existing workflows:

- **NotebookLM:** A research and writing assistant from Google.
- **GitHub Copilot:** An AI pair programmer for software developers.
- **Microsoft Copilot:** Integrated across the Microsoft 365 ecosystem.

Thank you

Thanks for listening

David Jaggi
david.jaggi@zhaw.ch