BLACKBIRD FOR TRAINING

Advanced Prompt Writing and Data Analysis Using Generative AI

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Cairo (Egypt)

UK Traininig
PARTNER



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Introduction

In the era of artificial intelligence, the ability to communicate effectively with AI models has become a critical skill for professionals across all fields. Generative AI tools like Gemini are powerful, but their true potential can only be unlocked through well-crafted prompts. The difference between a generic, superficial response and a deep, actionable insight often lies in the quality of the prompt itself.

The course "Advanced Prompt Writing and Data Analysis Using Generative AI" has been designed to equip participants with the skills to write effective, precise, and sophisticated prompts that extract maximum value from AI tools. Beyond basic prompting, the course dives into advanced techniques such as Few-shot prompting, Chain-of-Thought reasoning, and Tree-of-Thought exploration. It also covers the practical application of these skills in analyzing real-world data, generating intelligent reports, and solving complex business problems.

This course bridges the gap between AI capabilities and practical workplace applications, enabling participants to transform raw data into actionable insights and automate analytical tasks with confidence.

Course Objectives

This course aims to empower participants with advanced skills in prompt engineering and data analysis, summarized in the following objectives:

1. Mastering the Fundamentals of Prompt Writing: Understanding the key components of effective prompts and avoiding common mistakes that lead to poor AI responses.
2. Advanced Prompting Techniques: Learning and applying sophisticated techniques such as Few-shot prompting, Chain-of-Thought, and Tree-of-Thought to solve complex problems.
3. Output Customization: Developing the ability to control response length, style, format, and technical depth to match specific requirements.
4. AI-Powered Data Analysis: Using Gemini to analyze production, maintenance, and inventory data, uncovering patterns, and identifying anomalies.
5. Intelligent Report Generation: Automating the creation of professional reports, identifying trends, and generating actionable recommendations.
6. Practical Application: Applying all learned skills in real-world scenarios through hands-on exercises and comprehensive workshops.



Course Outlines

Level: Intermediate to Advanced
Duration: 2 Days 8 Training Hours
Target Audience: All Employees Advanced Level

Day 1: Fundamentals and Advanced Prompt Writing

1.1 Course Opening and Introduction

Topics Covered:

- Welcoming participants and ice-breaking activities
- Reviewing course objectives and expected outcomes
- Understanding the importance of prompt writing in the age of AI
- The impact of prompt quality on AI output quality
- Overview of the course structure and methodology
- Setting expectations and ground rules for participation
- Assessing participants' current prompting experience

1.2 Fundamentals of Prompt Writing

Topics Covered:

- What is a Prompt? Definition and importance in AI interactions
- Key Components of an Effective Prompt:
  - Role: Defining who the AI should act as e.g., "You are a senior data analyst"
  - Context: Providing background information relevant to the task
  - Task: Clearly stating what you want the AI to do
  - Format: Specifying how you want the response structured
  - Constraints: Setting boundaries and limitations for the response
- The Anatomy of a Great Prompt: Breaking down successful prompts to understand what makes them work
- Common Prompting Mistakes:
  - Vague or ambiguous instructions
  - Missing context or background
  - Overly complex or multi-part questions
  - Asking for too much or too little
  - Not specifying output format
- Examples of Good vs. Bad Prompts: Side-by-side comparisons with analysis
- Prompt Templates: Creating reusable templates for common tasks
- The Iterative Prompting Process: How to refine prompts progressively

1.3 Advanced Prompting Techniques

Topics Covered:



- Few-Shot Prompting:
    - What is Few-shot prompting and when to use it
    - Providing examples to guide AI behavior
    - Choosing the right number and quality of examples
    - Few-shot vs. Zero-shot prompting
    - Practical applications in business contexts
    - Examples of effective Few-shot prompts
- Chain-of-Thought CoT Prompting:
    - What is Chain-of-Thought reasoning
    - How CoT improves problem-solving and logic
    - Encouraging step-by-step reasoning
    - CoT for complex mathematical and analytical tasks
    - CoT for troubleshooting and root cause analysis
    - Examples of CoT prompts in action
    - Automatic Chain-of-Thought techniques
- Tree-of-Thought ToT Prompting:
    - What is Tree-of-Thought reasoning
    - Exploring multiple reasoning paths simultaneously
    - When to use ToT over CoT
    - ToT for complex decision-making and strategy
    - Examples of ToT prompts
    - Combining CoT and ToT for maximum effectiveness
- Other Advanced Techniques:
    - Self-consistency prompting
    - Generated knowledge prompting
    - ReAct Reasoning + Acting prompting
    - Persona-based prompting
    - Emotional prompting

1.4 Practical Exercises on Advanced Techniques

Topics Covered:



- Exercise 1: Few-Shot Prompting:
    - Writing a prompt to classify customer feedback with examples
    - Writing a prompt to generate product descriptions with style examples
    - Comparing Few-shot vs. Zero-shot results
- Exercise 2: Chain-of-Thought Prompting:
    - Writing a CoT prompt for troubleshooting a printing defect
    - Writing a CoT prompt for cost analysis and optimization
    - Analyzing the step-by-step reasoning process
- Exercise 3: Tree-of-Thought Prompting:
    - Writing a ToT prompt for strategic decision-making
    - Writing a ToT prompt for exploring multiple solutions to a problem
    - Evaluating different reasoning paths
- Exercise 4: Combining Techniques:
    - Creating prompts that combine Few-shot, CoT, and ToT
    - Testing and refining combined prompts
- Exercise 5: Problem-Solving Challenge:
    - Using advanced prompting to solve a complex business problem
    - Presenting the solution approach
    - Group discussion and feedback
- Peer Review:
    - Reviewing and improving each other's prompts
    - Sharing insights and best practices

1.5 Output Customization

Topics Covered:



- Controlling Response Length:
  - Specifying desired word count or paragraph count
  - Getting concise vs. detailed responses
  - Using length constraints effectively
- Controlling Response Style:
  - Formal vs. informal tone
  - Technical vs. simplified language
  - Professional vs. conversational style
  - Active vs. passive voice
- Controlling Technical Depth:
  - Adjusting for beginner, intermediate, or expert audiences
  - Providing explanations at different levels
  - Including or excluding technical jargon
- Controlling Response Format:
  - Bullet points vs. paragraphs vs. tables
  - Report structure vs. summary vs. list
  - Including headings and subheadings
  - Requesting visual representations charts, diagrams
- Controlling Perspective:
  - Executive perspective
  - Technical perspective
  - Customer perspective
  - Employee perspective
- Examples of Customization in Action:
  - Same prompt, different styles and formats
  - Analyzing the impact of customization on output quality
- Practical Guidelines:
  - When to use each style and format
  - How to specify customization requirements clearly
  - Balancing customization with clarity

1.6 Additional Practical Exercises - Prompt Optimization

Topics Covered:



- Exercise 1: Length Control:
    - Writing a prompt requesting a summary in specific lengths 50 words, 200 words, 500 words
    - Comparing outputs at different lengths
- Exercise 2: Style Control:
    - Writing prompts to generate the same content in different styles
    - Comparing formal vs. informal versions
- Exercise 3: Technical Depth:
    - Writing prompts for different audience levels
    - Comparing explanations for beginners vs. experts
- Exercise 4: Format Control:
    - Requesting the same information in different formats
    - Comparing bullet points vs. tables vs. prose
- Exercise 5: Prompt Refinement:
    - Starting with a basic prompt and iteratively improving it
    - Testing and measuring improvement in output quality
- Exercise 6: Real-World Application:
    - Writing a prompt for a real work task with customization requirements
    - Sharing and discussing results
- Prompt Library Development:
    - Creating a personal library of optimized prompts
    - Categorizing prompts by use case
    - Sharing prompts with colleagues

1.1 Week 1 Summary and Q&A Session

Topics Covered:

- Comprehensive review of Day 1 concepts:
    - Prompt fundamentals and common mistakes
    - Advanced techniques Few-shot, CoT, ToT
    - Output customization
    - Practical exercises and learnings
- Summary of key takeaways:
    - Quality prompts = Quality outputs
    - Advanced techniques unlock deeper insights
    - Customization ensures relevance
- Answering participants' questions and inquiries
- Preview of Day 2 content Data Analysis and Applications
- Preparation tasks for the next day

Day 2: Data Analysis and Applications

2.1 Day 1 Recap and Review

Topics Covered:



- Quick retrieval of key concepts from Day 1 through interactive questions
- Reviewing advanced prompting techniques
- Sharing experiences from Day 1 exercises
- Addressing any remaining queries
- Setting the stage for Day 2 data analysis applications
- Connecting prompt writing skills to data analysis tasks

2.2 Using Gemini for Data Analysis

Topics Covered:

- Introduction to AI-Powered Data Analysis:
    - How Generative AI can assist in data analysis
    - Types of data that can be analyzed structured, unstructured
    - Gemini's capabilities in data analysis
- Production Data Analysis:
    - Analyzing production volumes and throughput
    - Identifying trends and patterns in production
    - Detecting anomalies and outliers
    - Analyzing quality control data
    - Identifying factors affecting production efficiency
    - Predicting production outcomes
- Maintenance Data Analysis:
    - Analyzing maintenance logs and records
    - Identifying recurring fault patterns
    - Predicting maintenance needs and failures
    - Analyzing equipment performance metrics
    - Optimizing maintenance schedules
- Inventory Data Analysis:
    - Analyzing stock levels and turnover
    - Identifying slow-moving and fast-moving items
    - Optimizing reorder points and quantities
    - Analyzing supplier performance
    - Detecting inventory discrepancies
- Data Preparation for AI Analysis:
    - Organizing data for effective analysis
    - Summarizing large datasets
    - Identifying key metrics and KPIs
    - Structuring data for specific analysis tasks
- Prompt Strategies for Data Analysis:
    - Prompts for data exploration
    - Prompts for pattern identification
    - Prompts for anomaly detection
    - Prompts for prediction and forecasting
    - Prompts for root cause analysis



2.3 Practical Exercises - Analyzing Real Manufacturing Data

Topics Covered:

- Exercise 1: Production Data Analysis:
  - Providing a dataset of production records volumes, downtime, defects
  - Writing prompts to analyze production efficiency
  - Identifying trends and patterns in the data
  - Detecting anomalies and outliers
- Exercise 2: Maintenance Data Analysis:
  - Providing maintenance logs and fault records
  - Writing prompts to identify recurring faults
  - Predicting maintenance needs based on historical data
  - Recommending preventive maintenance actions
- Exercise 3: Inventory Data Analysis:
  - Providing inventory records stock levels, turnover, supplier data
  - Writing prompts to analyze inventory performance
  - Identifying slow-moving and fast-moving items
  - Recommending reorder points and quantities
- Exercise 4: Combined Analysis:
  - Analyzing the relationship between production, maintenance, and inventory data
  - Identifying cross-functional insights
  - Writing prompts that integrate multiple data sources
- Exercise 5: Root Cause Analysis:
  - Providing data about a specific problem e.g., quality defect, production delay
  - Writing prompts to identify root causes
  - Recommending corrective actions
- Exercise 6: Predictive Analysis:
  - Using historical data to predict future outcomes
  - Writing prompts for forecasting
  - Evaluating prediction accuracy

2.4 Generating Intelligent Reports Using Generative AI

Topics Covered:



- Automating Report Generation:
  - How AI can automate report creation
  - Components of an intelligent report
  - Structuring reports for different audiences
- Types of Reports:
  - Executive summaries
  - Performance dashboards
  - Analytical reports
  - Status reports
  - Recommendation reports
- Analyzing Trends and Patterns:
  - Identifying upward and downward trends
  - Recognizing seasonal patterns
  - Detecting correlations and causal relationships
  - Interpreting trend significance
- Generating Actionable Recommendations:
  - Moving from data to insights
  - Suggesting specific actions based on analysis
  - Prioritizing recommendations
  - Estimating impact of recommendations
- Report Structure and Formatting:
  - Executive summary
  - Methodology
  - Findings and analysis
  - Recommendations
  - Appendices
  - Using visual elements in reports
- Prompt Strategies for Report Generation:
  - Prompts for different report types
  - Prompts for specific audiences
  - Prompts for integrating multiple analyses
  - Prompts for including recommendations
- Quality Assurance:
  - Verifying report accuracy
  - Checking for completeness
  - Reviewing clarity and readability
  - Validating recommendations

2.5 Comprehensive Applied Workshop - Complete Analytical Report

Topics Covered:



- Workshop Structure:
  - Dividing participants into teams
  - Providing a comprehensive dataset production, maintenance, inventory
  - Assigning a real-world analytical task to each team
- Workshop Scenario:
  - Each team must produce a complete analytical report addressing a specific business challenge
  - Example challenges:
    - Production efficiency improvement
    - Cost reduction through better maintenance
    - Inventory optimization
    - Quality improvement
    - Resource allocation optimization
  - The report must include:
    - Executive summary
    - Data analysis and findings
    - Trend analysis
    - Recommendations
    - Implementation plan
- Work Methodology:
  - Teams will use Gemini to:
    - Explore and analyze the dataset
    - Identify patterns and trends
    - Generate insights and recommendations
    - Produce a professional report
  - Teams will:
    - Collaborate effectively
    - Divide tasks and responsibilities
    - Integrate individual contributions
    - Apply all learned prompting techniques
- Team Presentations:
  - Each team presents their analytical report
  - Presenting the executive summary
  - Highlighting key findings
  - Presenting recommendations
  - Explaining the methodology used
  - Showing examples of prompts used
- Peer and Trainer Evaluation:
  - Constructive feedback from other teams
  - Expert insights and recommendations from the trainer
  - Evaluating report quality, depth of analysis, and quality of recommendations
  - Identifying best practices and lessons learned
- Key Learnings and Takeaways:
  - Common challenges in data analysis and report writing
  - Best practices for AI-powered analysis
  - How to produce high-quality reports efficiently
  - The value of collaboration in analytical tasks



2.6 Course Summary, Assessment, and Conclusion

Topics Covered:

- Comprehensive Review:
  - Recap of Day 1 concepts Prompt fundamentals, advanced techniques, customization
  - Recap of Day 2 concepts Data analysis, report generation
  - Connecting all concepts in an integrated framework
  - Re-emphasizing key takeaways
- Key Takeaways from the Course:
  - Effective prompt writing unlocks AI's full potential
  - Advanced techniques provide deeper and more accurate insights
  - Output customization ensures relevance for different audiences
  - AI-powered analysis transforms raw data into actionable intelligence
  - Automated reporting saves time and improves consistency
- Short Quiz:
  - Assessing understanding of prompt techniques
  - Questions on data analysis strategies
  - Questions on report generation
  - Practical scenario-based questions
  - Immediate feedback and explanation of answers
- Course Evaluation Survey:
  - Collecting participant feedback on content quality, trainer performance, and materials
  - Assessing the usefulness of the course for participants
  - Suggestions for improvement
  - Identifying additional training needs
- Closing Remarks and Recommendations:
  - Encouraging continued practice of prompt writing
  - Suggested resources for further learning
  - Building a personal prompt library
  - Sharing knowledge with colleagues
  - Applying skills to real work challenges
- Certificate Distribution:
  - Awarding certificates of completion to participants
  - Recognizing their commitment and skill development

Conclusion

At the conclusion of this course, participants have transformed their ability to communicate with AI tools from basic interactions to sophisticated, precision-engineered prompts that extract maximum value from Generative AI. They now possess a comprehensive toolkit of advanced prompting techniques—from Few-shot and Chain-of-Thought to Tree-of-Thought reasoning—enabling them to tackle complex problems with confidence.



The practical focus on data analysis has equipped participants with the skills to transform raw manufacturing data production, maintenance, inventory into actionable insights. They can now identify patterns, detect anomalies, predict outcomes, and generate professional reports automatically, saving time and improving decision quality.

The hands-on workshop provided real-world experience in producing complete analytical reports, integrating all learned skills into a cohesive workflow. This experience builds confidence and provides a template for applying these skills immediately in the workplace.

In an era where data is abundant but insights are valuable, the ability to effectively prompt AI and analyze data is a critical competitive advantage. This course has given participants the tools to turn data into decisions, and questions into answers.

