



Google Developer Groups
On Campus • BBIT

AI HANDS ON WORKSHOP

Join us for a hands-on, power-packed session where creativity meets cutting-edge AI tools!

WHAT YOU WILL GET

- Prompt Engineering with -
 - Google AI Studio
 - Vertex AI
 - Weights & Biases
- Resource Materials
- Q&A Sessions
- Certificate

Bonus: Wrap it up with a fun AI Skills Quiz to test your prompt powers and win certificates



- By Sarthak Chakraborty & Chandranil Adhikary

Workshop Agenda :

- Foundations of Prompt Engineering
- Multimodality in AI
- Google AI Studio Deep Dive
- Scaling with Vertex AI
- Experiment Tracking with Weights & Biases

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Budge Budge Institute of Technology

Who am I:

3rd-year Computer Science Engineering undergrad

Ex-Intern @ Salesforce (Remote)

Full Stack & App Developer — from frontend finesse to backend brains, I build end-to-end solutions.

Exploring the world of AI/ML — building intelligent systems that learn, adapt, and solve real-world problems.

2+ years of hands-on experience in Cloud & DevOps — automating workflows and architecting reliable systems.



Sarthak Chakraborty
App Dev Lead



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Google Developer Groups

Budge Budge Institute of Technology

Who am I :

3rd-year B.Tech undergraduate in CSE (AI)

Passionate MERN Stack Developer in building impactful solutions

ML Enthusiast and an lifelong learner

A Trailblazer and an remote ex-intern at Salesforce

SIH'24 Internal Hackathon Winner



Chandranil Adhikary
AI/MI Lead

What is Artificial Intelligence (AI)?

Artificial Intelligence (AI) is the ability of machines to mimic human intelligence. AI can learn from experience, adjust to new inputs, and perform tasks that typically require human intelligence, such as problem-solving, decision-making, and language understanding.

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What is Prompt Engineering?

Prompt Engineering is the art and science of designing effective inputs (prompts) to get the best possible output from an AI model, especially large language models (LLMs) like Gemini.

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History and Evolution

- **Early days:** Basic queries to AI models (e.g., search engines)
- **2015:** Introduction of large language models (like OpenAI's GPT), prompting becomes more refined
- **2018–2020:** Rise of pre-trained transformer models (GPT-2, GPT-3), increasing complexity in prompts
- **Today:** Advanced techniques for multimodal and zero-shot/few-shot learning

Anatomy of a Prompt

- **Task:** What you want the AI to do.
 - a. *Example:* "Write a poem about nature."
- **Context:** Additional information to clarify the task.
 - a. *Example:* "You are a famous poet."
- **Role:** The persona the AI adopts.
 - a. *Example:* "As a 19th-century poet."
- **Constraints:** Guidelines for format, style, or length.
 - a. *Example:* "4 stanzas, 5 lines each."



Prompt Types:

- **Zero-shot:** AI performs a task with no prior examples.
- **Few-shot:** AI is given a few examples to guide its response.
- **Chain-of-thought:** AI is encouraged to reason step-by-step to solve a problem.

Temperature, Top-k, Top-p:

Temperature: Controls randomness in AI output.

- Low (e.g., 0.1): More predictable, less creative.
- High (e.g., 1.0): More varied, creative responses.

Top-k: Limits AI to the top **k** most likely next words.

- *Example:* k=5 means AI picks from the 5 most probable words.

Top-p (Nucleus Sampling): Chooses from the smallest set of words that have a cumulative probability of **p**.

- *Example:* p=0.9 means AI picks from words that together make up 90% of the probability mass.

Prompt Examples with Gemini

- **Text:** "Summarize this paragraph in 1 sentence."
- **Code:** "Write a Python function to check for prime numbers."
- **Image + Text:** "Describe this image in 3 words." (with image input)
- **Data:** "Analyze this sales chart and highlight key trends."
- **Role-based:** "Act as a travel guide and suggest places in Japan."



Role of System Prompts

System prompts set the AI's behavior and tone before user interaction.

- Define **personality, style, or rules** for responses.
- Example: “*You are a helpful, friendly assistant.*”

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Prompt Failures – What to Avoid?

1. **Too vague** – AI gets confused.

Bad: “Tell me about it.”

2. **Too long/complex** – Hard to follow.

Bad: Long, rambling prompts with no clear task.

3. **Conflicting instructions** – Causes mixed results.

Bad: “Be formal and casual at the same time.”

4. **Lack of context** – Leads to irrelevant answers.

Bad: No background info for the task.

Tips for Writing Effective Prompts

Be Clear – State exactly what you want.

Be Specific – Add details, format, tone, etc.

Set a Role – Tell AI who to act as.

Give Context – Provide background if needed.

Use Examples – Guide the AI with samples.

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Prompt Tuning vs Fine-Tuning

Prompt Tuning: Adjusts **input prompts** to guide pre-trained model behavior.

-  Faster, cheaper, no retraining needed.

Fine-Tuning: Trains the **model itself** on new data.

-  More control, but time & resource intensive

Hands-on Prompt:

Prompt: “Describe GDG Build with AI in 2 lines, like a social media post.”

Example Output:

 GDG Build with AI was a power-packed event full of innovation and inspiration!

From live demos to AI magic — tech enthusiasts leveled up together!

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Varying Parameters

Temperature: Controls randomness.

- Low = focused 🔎 | High = creative 🎨

Top-k: Picks from top k likely words.

- Lower = safer | Higher = varied

Top-p: Picks from top p% probability mass.

- Balances focus + creativity

Output Token Limits – Real Impact

Limits how much text the model can generate.

Too short? Response cuts off 

Right size? Clear, complete answer 

Prompt Evaluation Techniques

Accuracy – Is the response correct?

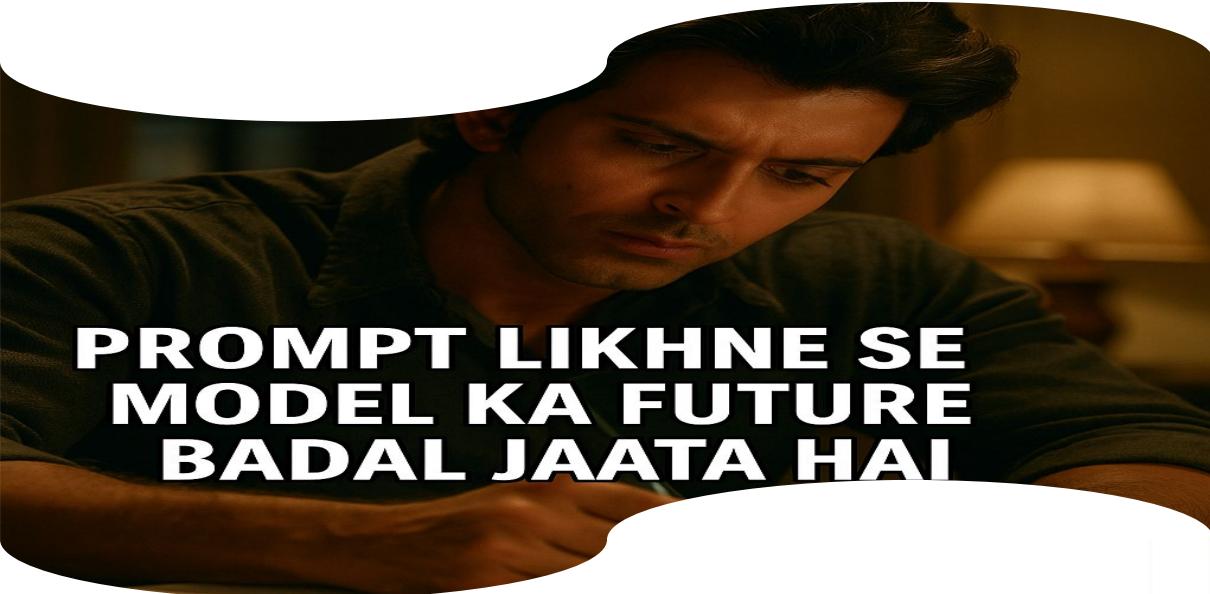
Relevance – Does it answer the prompt well?

Clarity – Is it easy to understand?

Creativity – Is the output original or insightful?

Consistency – Similar results across runs?

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What is Multimodal AI?

Multimodal AI combines multiple types of data (e.g., text, images, audio) to understand and generate responses.

- Example: AI that can see, hear, and read for more holistic tasks.

Image + Text = Magic!

Multimodal AI can process both images and text together.

- Example: AI **describes** an image in words or **generates** captions for visual content.
- Combines **visual understanding** and **language** for richer outputs!

Video + Text – Use Cases

Video Summarization: AI generates a **short summary** of a video's content.

Captioning/Subtitles: AI generates **real-time captions** for videos.

Sentiment Analysis: Analyzes video content and **associates emotions** with text.

Searchable Video: Transforms video content into **searchable text** for easier discovery.

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Text + Audio

AI combines **spoken audio + text** to enable features like **voice commands, transcription, and voice-based search.**

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Example: Image Description Prompt

 **Prompt:** “Describe this image in one sentence.”
AI analyzes visuals to generate accurate, descriptive captions.

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Example: Video-Based Question Answering

 **Prompt:** “What did the speaker say about climate change in this video?”

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Multimodal Content Structures

Combines **text + image + audio/video** in one prompt or task.

Enables richer, more **interactive AI experiences**.

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Challenges in Multimodal Learning

⚠ Syncing data types, training on diverse datasets, high computation, and context understanding.

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Use Cases:

-  **Interior Design:** Upload a room image + ask for decor ideas.
-  **Fruit Salad:** Show ingredients + ask for recipe or nutrition info.

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What is Google AI Studio ?

A web-based platform to **build, test, and deploy** AI models using Gemini and other tools.

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Interface Walkthrough

Explore the **dashboard**, **prompt editor**, **media upload**, and **output viewer**.

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How **Gemini** Works Behind the Scenes

Gemini processes **multimodal inputs** (text, image, etc.) using **advanced transformers**.

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Setting Up Your API Key

Get your **API key** from Google Cloud Console to start using Gemini via code.

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Exploring Models: Gemini Flash vs Pro

- ◆ **Flash:** Fast, lighter
- ◆ **Pro:** More powerful, deeper reasoning

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Code Walkthrough: Prompt with generate()

```
from google.generativeai import GenerativeModel  
  
model = GenerativeModel('gemini-pro')  
  
response = model.generate("Give 3 creative uses of AI in education.")  
  
print(response.text)
```

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Hands-on: Image + Prompt

Upload an image → Write a prompt → See AI's
visual understanding in action.

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Hands-on: Video+ Prompt

Add a video clip → Ask a question → Get
video-aware answers.

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Tool Integrations in Google AI Studio

Connect with tools like **Weights & Biases**,
Vertex AI, and **APIs** for extended functionality.

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Streaming vs Direct Completion

Streaming: Output as it's generated (live typing)

Direct: Full response at once

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Real-Time Function Calling – Concept

AI can **trigger functions** during a prompt to fetch live data or run tasks.

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Calling APIs from Prompts

Use prompts to **interact with APIs** (e.g., get weather, fetch data, run services).

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Uploading Media (Images/Videos)

Drag/drop or upload media files for **multimodal prompting**.

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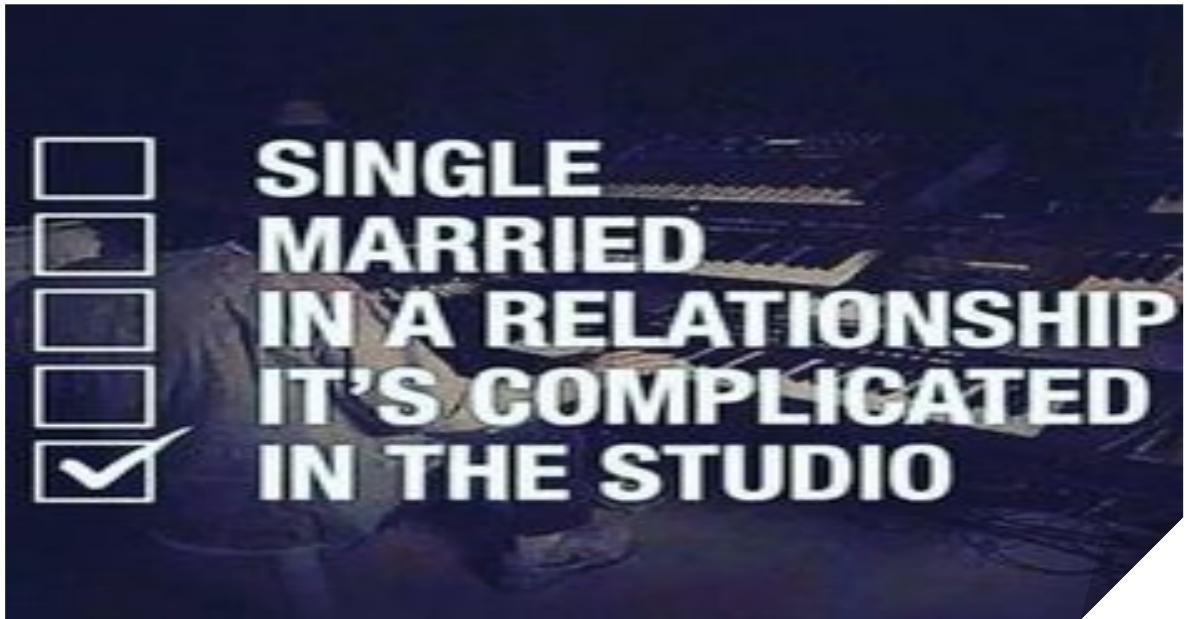


Activity: Your First Prompt in



Try crafting and running a prompt with **text**,
image, or **video** input.

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What is Vertex AI

Vertex AI is Google Cloud's unified platform for building, deploying, and scaling ML models using pre-trained and custom models.

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Vertex AI **vs** AI Platform

Vertex AI Studio offers a low-code UI for prototyping generative models, while AI Platform focuses more on traditional ML model training and deployment workflows.

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Creating Pipelines with Vertex AI

Vertex Pipelines automate ML workflows using Kubeflow or TensorFlow Extended for reproducibility and scalability.

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Model Deployment in Vertex AI

Deploy ML models as scalable, secure endpoints for online predictions with autoscaling and versioning.

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Connecting API to Vertex AI

Use Vertex AI Studio or endpoints to integrate Gemini (Google's LLM) for advanced generative AI tasks in your workflows.

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Vertex AI + LangChain Demo

Showcase how to build LLM-powered apps using LangChain with Vertex AI for prompt chaining and tool integration, demonstrated via video.

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Vertex AI

for MLOps

Supports full MLOps lifecycle—data prep, training, deployment, CI/CD, and monitoring—with built-in tools and integrations.

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Managed Datasets + AutoML

Easily upload and manage datasets in Vertex, then train models using AutoML with minimal code.

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Integrating with Outputs



Google AI Studio



Vertex AI

Export prompts or model prototypes from AI Studio and use them in production with Vertex AI endpoints.

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Use Case: Serving Multimodal Chatbot

Build and serve chatbots that handle text, images, or audio using Vertex's multimodal model capabilities.

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Bas thoda aur train karne do...



Runtime disconnected

**kyun toot jaati hai
Colab session ki dosti?**

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Monitoring and Logging in



Track model performance, latency, and errors with built-in monitoring, logging, and alerting tools.

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Vertex AI

Cost Considerations

Understand pricing for training, hosting, data storage, and APIs to optimize usage and budget.

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Security + IAM Roles

Ensure secure access with role-based permissions, VPC service controls, and encrypted data handling.

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DEPLOY HO GAYA!



**Ab toh main DevOps
engineer bhi hoon!**

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What is Weights & Biases (W&B)?

W&B is a popular tool for experiment tracking, model monitoring, and collaboration in machine learning workflows.

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Why Track Experiments?

Tracking helps compare results, debug issues, reproduce experiments, and improve model performance systematically.

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Logging Parameters

Capture hyperparameters and config values to understand their impact on model training.

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Visualizing Metrics

Plot losses, accuracy, and custom metrics in real-time to monitor training and evaluate models.

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Walking

Running

Sprinting

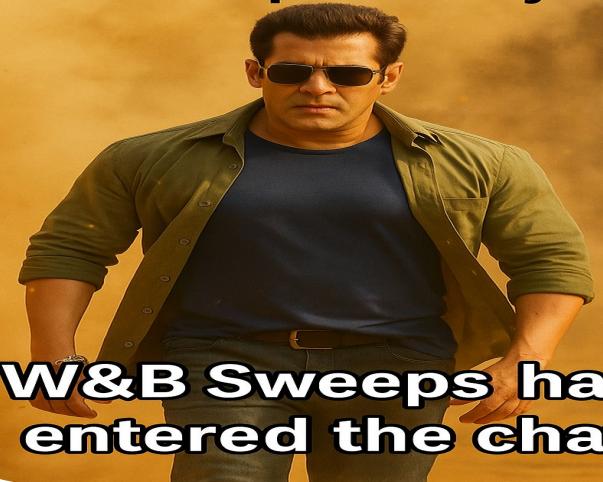
**Setting up
Weights &
Biases' Platform**

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**Mujhe laga mai
hyperparameter tuning
sikh chuka hoon, tab tak
W&B Sweeps ne entry maari**



**W&B Sweeps has
entered the chat**

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Track Model Inputs/Outputs

Log model inputs, predictions, and actual labels
to audit performance and detect edge cases.

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Comparing Runs

Use side-by-side charts and tables to compare different experiment runs and fine-tune models.

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Creating Reports in Weights & Biases

Generate shareable reports with visualizations, commentary, and results to communicate insights.

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Integration with Google AI Studio

Sync W&B with Google AI Studio to log generative AI prompt experiments and results.

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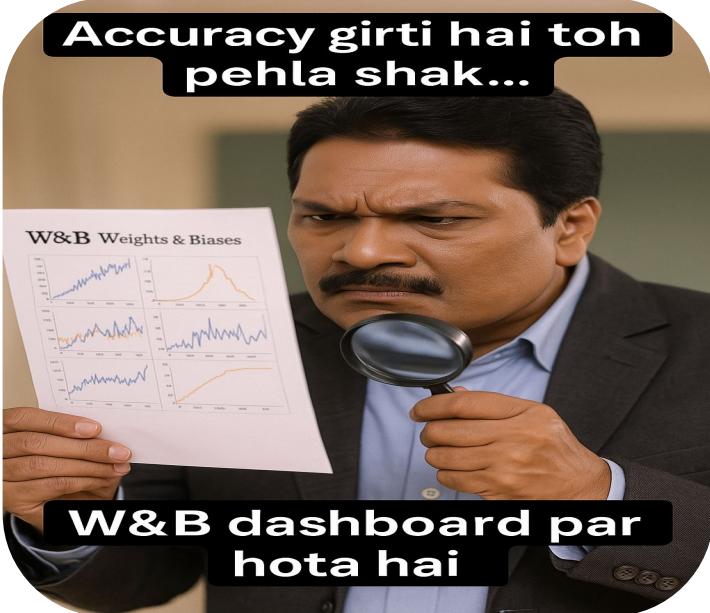


Demo: Track Prompt Variations

Demonstrate how to log and visualize performance for different LLM prompts in W&B.

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Tips for Weights & Biases Hygiene

Maintain clean, organized logs—use tags, consistent naming, and regular cleanups for scalable tracking.

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Weights & Biases **Team Features** **(optional)**

Collaborative tools like shared dashboards, team workspaces, and permission controls for ML teams.

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Hands-On Task: Prompt Engineering in Action

Get started with



& Prompts using:



Google AI Studio



Vertex AI

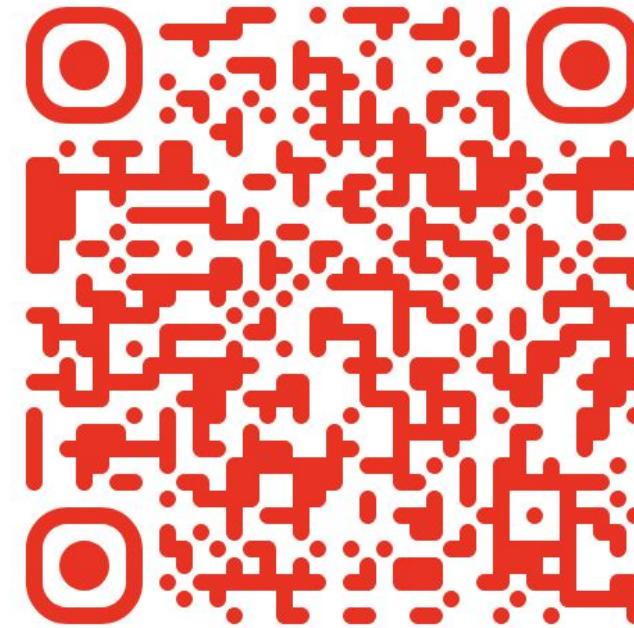


Weights & Biases

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Join the Hands-On Workshop Session



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chandranil-adhikary-8b8862250



Chandranil16



chandranil



Chandranil1603



Chandranil Adhikary
AI/MI Lead

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Follow me on:



[chakrabortysarthak](#)



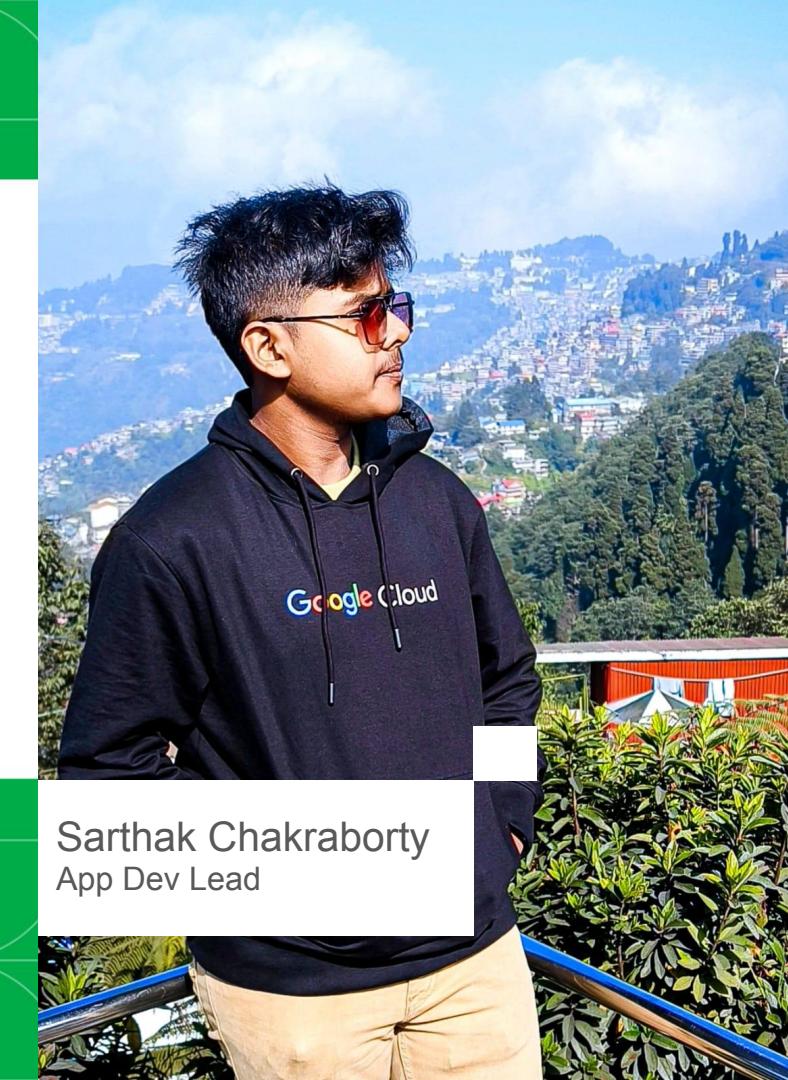
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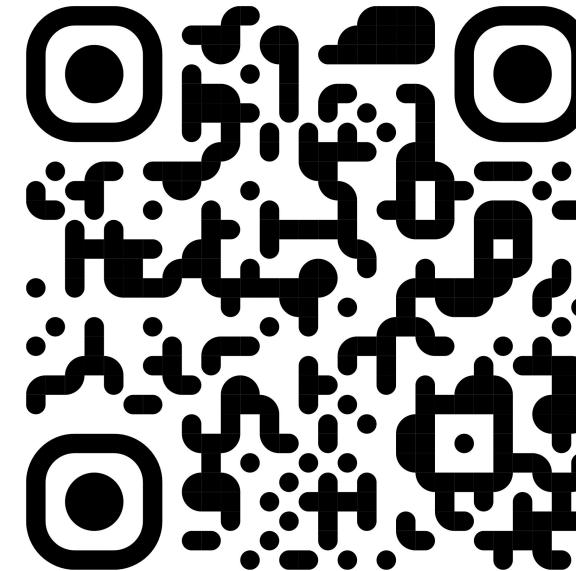


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Join the Quick Quiz Session



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