PRAGYAN AI

Grow with Gyan

To:

The Head of Department (HOD)

Department of Artificial Intelligence & Machine Learning / Artificial Intelligence & Data Science

Sai Vidhya Institute of Technology, Bengaluru

Subject: Proposal for a 7-Day Intensive Workshop on Generative and Agentic AI

Respected HOD,

This proposal outlines a comprehensive 7-day workshop designed to provide students of the AIML/AIDS department with advanced, practical skills in the rapidly evolving fields of **Generative and Agentic AI**. As students specializing in AI, a deep, hands-on understanding of Large Language Models (LLMs), RAG systems, and autonomous AI agents is critical for securing top-tier roles and driving future innovation.

This program builds upon a proven bootcamp structure to offer an immersive, project-driven experience that will give your students a significant competitive edge and a portfolio of real-world AI applications.

1. Program Objectives & Student Benefits

Upon completion of this intensive 7-day program, your AIML/AIDS students will be able to:

- **Master the End-to-End AI Workflow**: From foundational concepts of Transformers to deploying sophisticated multi-agent systems.
- **Build and Deploy Advanced RAG Systems**: Create chatbots and knowledge assistants that reason with private, complex, and multi-modal data sources (PDFs, SQL, CSVs, websites).
- **Engineer and Orchestrate AI Agents**: Design and construct multi-agent AI systems using frameworks like CrewAI and LangGraph that can perform complex tasks autonomously.

- **Fine-Tune LLMs**: Gain practical experience with parameter-efficient fine-tuning (PEFT) techniques like LoRA and QLoRA to customize models for specific tasks.
- **Develop a Professional Portfolio**: Complete multiple hands-on mini-projects and a final capstone project, all hosted on platforms like Streamlit, Hugging Face Spaces, and GitHub, to showcase their skills to employers.

2. Pedagogy & Methodology

Our training methodology is centered on the principle of**"learning by doing"** to ensure that students build real, applicable skills. Each day of the workshop is a balanced mix of the following components:

- **Conceptual Theory**: We provide clear and concise explanations of the core concepts, ensuring students understand the "why" behind the technology.
- **Live Demonstrations**: Instructors code and build AI applications live, walking students through the process step-by-step to bridge the gap between theory and practice.
- **Hands-On Labs**: Students actively participate by coding along in shared Google Colab notebooks, immediately applying what they've learned in a practical environment.
- **Project-Based Learning**: Mini-projects at the end of key modules and a final capstone project are used to reinforce learning, build confidence, and create tangible portfolio assets.

3. Tools & Platforms

Throughout the workshop, students will gain hands-on experience with a suite of industry-standard tools and platforms essential for modern AI development.

- **Core AI Frameworks**:
    - **Hugging Face**: Used for accessing pretrained models, transformers, and deploying applications on Spaces.
    - **LangChain & LangGraph**: Core frameworks for orchestrating LLM chains, agents, and complex workflows.

  - **LlamaIndex**: A data framework for building RAG applications by ingesting and indexing data from various sources.
  - **CrewAI**: A framework for building and orchestrating multi-agent AI systems.
- **UI & Deployment**:
  - **Streamlit**: Used to build and deploy interactive web applications and user interfaces for the AI bots and projects.
  - **Gradio**: A tool for creating simple user interfaces for machine learning models.
  - **GitHub**: For version control and hosting project code.
- **LLM & API Endpoints**:
  - **GROQ & Cohere**: High-speed LLM playgrounds and APIs used for rapid text generation and inference.
  - **OpenAI & Gemini**: Utilized for accessing state-of-the-art LLMs and MLLMs like GPT-4V and Gemini Pro.
  - **Search APIs (SerpAPI/Bing API)**: Integrated as tools for agents to access real-time web search results.
- **Data & Vector Databases**:
  - **FAISS**: A library for efficient similarity search, used as a vector store in RAG pipelines.
  - **PandasAI**: A tool for creating data analysis agents that can interact with dataframes.

4. Deliverables for Students

Upon successful completion of the 7-day workshop, each student will receive:

- **A Professional AI Portfolio**: A collection of multiple hands-on projects and mini-projects hosted on public platforms like GitHub, Streamlit Cloud, and Hugging Face Spaces, demonstrating practical skills to potential employers.
- **Deployable AI Applications**: At least three fully functional, end-to-end AI applications, including a RAG-based knowledge bot, a multi-agent workflow, and a final capstone project.

- **Demonstrable Skills**: Proven ability to engineer prompts, build and fine-tune RAG systems, and design autonomous AI agents for complex tasks.
- **Curated Learning Materials**: Access to all Google Colab notebooks, code repositories, and curated learning resources used during the program.
- **Certificate of Completion**: A certificate from PragyanAI recognizing their successful completion of the intensive workshop on Generative and Agentic AI.

5. Detailed 7-Day Curriculum

The workshop is structured for a deep dive and split across two weeks to ensure an immersive learning experience.

Week 1: Foundations to Advanced RAG (4 Days)

- **Day 1: Foundations of Generative AI & LLMs**
  - **Theory**: Generative vs. Agentic vs. Traditional AI; The Transformer Architecture; The LLM Ecosystem (LLM, MLLM, VLM, SLM); Embeddings & Vector Databases.
  - **Labs**: Using Hugging Face to generate text with LLaMA/Mistral; Comparing LLM outputs in playgrounds (GPT-4, Claude, Gemini); Building a simple chatbot with Gradio and the GROQ API.
  - **Mini-Project**: "Marketing Content Generator" hosted on Streamlit.
- **Day 2: Prompt Engineering & Introduction to LangChain**
  - **Theory**: Mastering Prompting Techniques (Zero-shot, few-shot, Chain-of-Thought, ReAct); Handling Hallucination & Prompt Debugging; Overview of LangChain & LlamaIndex.
  - **Labs**: Crafting prompts for complex reasoning; Building an "AI Career Advisor Bot" with role-based prompts; Using LangChain's `PromptTemplate`.
  - **Mini-Project**: "Prompt Engineer's Toolkit" – A Streamlit web app for testing prompt templates.
- **Day 3: Building Knowledgeable Bots with RAG**

  - **Theory**: Introduction to Retrieval-Augmented Generation (RAG); The RAG Pipeline (Ingestion, Chunking, Embedding, Retrieval); Vector Databases using FAISS.
  - **Labs**: Building a Q&A bot with LangChain/LlamaIndex; Developing a customer support bot using a product's PDF documentation.
  - **Mini-Project**: "Chat with Your Data" – A RAG model that can answer questions from a document or website, deployed on Hugging Face Spaces.
- **Day 4: Advanced RAG & Multi-Modal AI**
  - **Theory**: Advanced RAG for structured (CSV, SQL) and unstructured data; Multi-modal LLMs (GPT-4V, Gemini Pro) for vision and language tasks; MLLM Use Cases (Image Captioning, Visual Q&A, OCR Chatbots).
  - **Labs**: Building a unified chat interface for Excel/CSV and PDF data with LlamaIndex; Using Gemini to analyze images and extract text via OCR.
  - **Mini-Project**: "Image-based Chatbot" where a user can upload a menu image and ask questions about its content.

Week 2: Agentic AI and Capstone Project (3 Days)

- **Day 5: Introduction to Agentic AI**
  - **Theory**: What makes an AI "agentic"? (Autonomy, Planning, Tool Use, Task Decomposition) ; Agentic Frameworks (AutoGen, CrewAI); The ReAct Framework.
  - **Labs**: Using **CrewAI** to build a multi-agent team (e.g., Research Agent + Writer Agent); Building a Web Search Agent using SerpAPI.
  - **Mini-Project**: "AI Research + Report Writer Agent Team" that researches a topic online and generates a PDF report.
- **Day 6: Advanced Agentic Workflows & Model Fine-Tuning**
  - **Theory**: Enterprise Agentic Workflows (HR, Finance); Agent Orchestration with LangGraph; Introduction to Parameter-Efficient Fine-Tuning (PEFT) with LoRA and QLoRA.
  - **Labs**: Building an HR Agent for resume screening; Fine-tuning a Flan-T5 or LLaMA-2 model on a custom Q&A dataset.

    - **Mini-Project**: "Research Paper Agent" to fetch and summarize academic papers from arXiv.
- **Day 7: Capstone Project & Deployment (Brief Orientation - Assignment)**
    - **Workshop Day**: Students will build an end-to-end capstone project combining RAG, LangChain, and Agents.
    - **Capstone Project Options**:
        1. **"AI Career Counselor"**: An app that uses RAG on a student's resume and job datasets to provide career advice.
        2. **"Smart Syllabus Explorer"**: An app that ingests syllabus PDFs to answer questions and find resources.
        3. **"Resume Feedback & Improvement Bot"**: An agent that analyzes a resume against a job description and suggests improvements.
    - **Final Session**: Project presentations, discussion on deploying AI applications at scale, and a Q&A on careers in Generative AI.

6. Program Logistics & Investment

- **Duration**: 7 Days, structured to be delivered over two consecutive weeks to allow for deeper immersion.
- **Batch Size**: The program is designed for a batch of 60 to 100 students(One Room). This size ensures each participant receives adequate attention during the hands-on labs.
- **Program Investment**:
    - The professional fee for delivering this comprehensive 7-day program is **₹15,000 per day**, leading to a total investment of **₹1,05,000**.

We are confident that this intensive workshop will empower your AIML/AIDS students with the specialized skills needed to excel in the field of Artificial Intelligence. We look forward to collaborating with you.

We look forward to collaborating with your department to deliver this impactful program.

Sincerely,

Sateesh Ambesange

PRAGYAN AI

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Cofounder & MD of PragyanAI

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