

AI Hackathon Problem Statements

Audio Projects

Music Genre Classification

Description: Develop a machine learning model to classify music clips into genres such as rock, jazz, or classical using audio features like tempo or spectral characteristics.

Suggested Dataset: GTZAN Genre Collection or Free Music Archive (FMA).

Tools: Python, Librosa, Scikit-learn.

Speech Emotion Recognition

Description: Create a system to detect emotions (e.g., happiness, sadness, anger) from speech recordings by analyzing vocal features.

Suggested Dataset: RAVDESS or EMO-DB.

Tools: TensorFlow, Keras, Librosa.

Audio Event Detection

Description: Build a model to identify specific events, such as glass breaking or dog barking, in audio streams for applications like security monitoring.

Suggested Dataset: UrbanSound8K or ESC-50.

Tools: PyTorch, Scikit-learn.

Music Style Transfer

Description: Develop a tool that applies the style of one music piece (e.g., classical) to another (e.g., pop), creating a new composition.

Suggested Dataset: MAESTRO (MIDI).

Tools: Magenta, MusicVAE.

Speaker Identification System

Description: Build a system that identifies or verifies speakers based on voice characteristics for authentication or analytics use cases.

Suggested Dataset: VoxCeleb.

Tools: PyTorch, SpeechBrain.

Video & Computer Vision Projects

Action Recognition in Videos

Description: Classify human actions (e.g., walking, running, jumping) in video clips using deep learning models for applications like sports analysis.

Suggested Dataset: UCF101 or HMDB51.

Tools: PyTorch, OpenCV.

Facial Expression Recognition

Description: Build a model to detect emotions (e.g., happy, sad, angry) from facial expressions in images or videos.

Suggested Dataset: FER2013 or AffectNet.

Tools: Keras, OpenCV.

Anomaly Detection in Surveillance Videos

Description: Identify unusual activities or behaviors in surveillance footage using unsupervised or semi-supervised learning.

Suggested Dataset: UCSD Pedestrian or ShanghaiTech.

Tools: PyTorch, Scikit-learn.

Automatic License Plate Recognition (ALPR)

Description: Detect and recognize vehicle license plates from images or video streams for traffic monitoring.

Suggested Dataset: OpenALPR or CCPD.

Tools: OpenCV, Tesseract, YOLO.

Document Layout Analysis

Description: Detect and classify elements such as tables, text blocks, and images in scanned documents.

Suggested Dataset: PubLayNet.

Tools: Detectron2, OpenCV.

Handwritten Text Recognition

Description: Convert handwritten text in scanned images into machine-readable digital text.

Suggested Dataset: IAM Handwriting Database.

Tools: TensorFlow, CRNN.

Medical Image Diagnosis Assistant

Description: Assist doctors by detecting abnormalities in X-rays or retinal images.

Suggested Dataset: ChestX-ray14 or Diabetic Retinopathy Dataset.

Tools: PyTorch, MONAI.

Tabular & Time-Series Projects

Predictive Maintenance

Description: Predict equipment failure using sensor data to optimize maintenance schedules.

Suggested Dataset: NASA Turbofan Jet Engine Dataset.

Tools: Scikit-learn, XGBoost, Pandas.

Customer Churn Prediction

Description: Predict which customers are likely to discontinue a service.

Suggested Dataset: Telco Customer Churn.

Tools: Scikit-learn, LightGBM.

Credit Scoring Model

Description: Assess creditworthiness of loan applicants using financial and demographic data.

Suggested Dataset: LendingClub or German Credit Dataset.

Tools: Pandas, Scikit-learn.

Disease Risk Prediction

Description: Predict disease likelihood using patient health records.

Suggested Dataset: Diabetes or Heart Disease Dataset.

Tools: TensorFlow, Scikit-learn.

Energy Consumption Forecasting

Description: Forecast future energy usage based on historical consumption patterns.

Suggested Dataset: Household Electric Power Consumption.

Tools: Prophet, Statsmodels.

Fraud Detection System

Description: Detect fraudulent transactions in financial systems.

Suggested Dataset: IEEE-CIS Fraud Detection.

Tools: XGBoost, Imbalanced-learn.

Stock Price Movement Prediction

Description: Predict short-term stock price movements using historical market data.

Suggested Dataset: Yahoo Finance.

Tools: LSTM, PyTorch.

NLP & Generative AI Projects

Fact-Check & Q&A Social Media Bot

Description: Monitor social media posts, identify factual claims, and respond with verified answers using LLMs and web search.

Tools: LLMs, Web Search APIs, RAG.

AI-Powered Travel Planner

Description: Generate personalized travel itineraries based on user preferences such as budget, duration, and interests.

Tools: LLMs, External APIs.

Lightweight Personal Productivity Assistant

Description: Capture and organize tasks, notes, and reminders using natural language input.

Tools: LLMs, Vector Databases.

RAG-Powered Website Chatbot

Description: Build a chatbot that ingests website content and answers questions using Retrieval-Augmented Generation.

Tools: LangChain, FAISS, LLMs.

Smart Developer Tool for API Integration

Description: Extract API details from documentation URLs and auto-generate SDK or wrapper code.

Tools: LLMs, Web Scraping.

Resume Screening & Skill Matching System

Description: Automatically screen resumes and match candidates to job descriptions.

Tools: NLP, Sentence Transformers.

Meeting Minutes Generator

Description: Convert meeting transcripts into concise summaries and action items.

Tools: Whisper, LLMs.

Code Review Assistant

Description: Analyze source code to detect bugs, style issues, and optimization opportunities.

Tools: LLMs, Static Analysis.

AI Tutor for Programming Concepts

Description: Build an interactive tutor that explains coding concepts and provides practice problems.

Tools: LLMs, Web UI.

Multilingual Chat Translation Bot

Description: Enable real-time translation across multiple languages in chat applications.

Tools: Transformers, MarianMT.

Knowledge Graph Builder from Text

Description: Extract entities and relationships from documents to build a searchable knowledge graph.

Tools: SpaCy, Neo4j.

Synthetic Data Generator

Description: Generate high-quality synthetic datasets for training ML models while preserving privacy.

Tools: GANs, CTGAN.

AI-Powered Recommendation Engine

Description: Recommend products, content, or courses based on user behavior.

Suggested Dataset: MovieLens.

Tools: Collaborative Filtering, PyTorch.

Autonomous Research Assistant

Description: Given a topic, automatically collect sources, summarize findings, and generate a research brief.

Tools: LLMs, Web Search, RAG.
