#Instructions

- **Please make a copy before you edit it: File -> Make a copy.**
- **Please find the problem statement and detailed template below.**
- **From where the template starts you will be allowed only 3 pages for the solution summary**
- **Please submit the final solution document with an access link in the submission form.**

Girl Hackathon
[Do not edit this section. This is read-only]

AI for Social Good

Accelerating the application of AI to some of the world's biggest challenges

Theme:

What if people could predict natural disasters before they happen? Track disease as it spreads, to eliminate it sooner? Or dramatically improve the lives of people with disabilities? AI can help, but it's not a silver bullet. Tackling these questions requires rooting innovation in research, responsibility, and a concerted, collaborative effort across all sectors of society.

Why we focus on AI (and to what end):
We're excited about the transformational power of AI and its helpful new applications. From research that expands what's possible, to product integrations designed to make everyday life easier, we're exploring responsible and innovative AI technologies that make a true difference for humanity.

The development of AI has created new opportunities to improve the lives of people around the world, from business to healthcare to education. It has also raised new questions about the best way to build fairness, interpretability, privacy, and safety into these systems. We would like to see you focus on these aspects too, where you try to ensure that there are ethical practices being followed into the world of AI.

Problem Statement:

In the face of growing environmental challenges, there is a pressing need to leverage AI technologies to monitor, analyze, and mitigate environmental issues. By harnessing the power of AI, we can gain valuable insights into environmental data, predict and prevent natural disasters, and promote sustainable practices. This will enable us to make informed decisions and take proactive measures to protect our planet for future generations. Problem Statement: The objective is to develop an AI-powered system that addresses the critical aspects of environmental conservation. The system should have the capability to monitor and analyze environmental data, predict and prevent natural disasters, and promote sustainable practices. Participants are encouraged to create an application or enhance existing platforms to achieve the following goals: **[Choose 1 of the following]**

- Environmental Data Monitoring: Design an AI system that can collect, process, and analyze various types of environmental data, including air quality, water pollution, deforestation rates, and climate patterns. The

system should provide real-time insights and visualizations to understand the current state of the environment.

- Natural Disaster Prediction: Develop AI algorithms and models that utilize environmental data to predict and identify potential natural disasters, such as hurricanes, floods, wildfires, and earthquakes. The system should be able to provide early warnings and assist in disaster preparedness and response efforts.
- Sustainable Practices Promotion: Create AI-driven mechanisms to encourage and promote sustainable practices among individuals, communities, and industries. This may include personalized recommendations, educational resources, and gamification elements to incentivize sustainable behavior and reduce ecological footprints.

By addressing these challenges, the AI system will contribute to the preservation of the environment, the prevention of natural disasters, and the promotion of sustainable practices for a more sustainable and resilient future.

Goodluck!

Submission:

Participants are required to create a PDF document as the final submission. The document should contain the link to a public GitHub repository (accessible and open to all).

The repository should have all the collaterals of the code, along with a README file. The code can be written in any open-source programming language using standard open-source libraries.

The README file should cover how to generate the environment needed to run the code, how to run the code, and any other necessary information.

Evaluation Rubrics:

- Potential Impact of Proposed idea (25%)
- Usage of correct algorithm and AI technique (25%)
- Code Quality (20%)
- Appropriateness of Data Structure (15%)
- Testing (15%)

Find Template to use below

(3 Pages Maximum from the template below)

2023 Girl Hackathon Ideathon Round: Solution Submission

Project Name: Natural disaster prediction(forest fire detection)
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ReadMe File Links (Eg: Github) : https://github.com/Shyama-22/Google_hackathon

Brief summary

Please summarize your problem statement and solution in a short paragraph.

The "forest-fire-detection-prediction-" aims to tackle the crucial problem of forest fire detection and prediction. Forest fires pose a significant threat to ecosystems and human lives, making accurate detection and timely prediction essential for effective prevention and mitigation strategies. The notebook provides a comprehensive solution by collecting and preprocessing relevant data, performing exploratory data analysis, selecting important features, and building and evaluating three different models: a Convolutional Neural Network (CNN), a Fully Connected Neural Network (MLP), and a CNN-RCNN model. The goal is to develop reliable and accurate models that can aid in early detection and prediction of forest fires, enabling prompt response and minimizing potential damages.

The solution begins with the collection of relevant datasets, including satellite imagery and weather data, which are crucial for analyzing and predicting forest fire incidents. Preprocessing steps are then applied to handle missing values, encode categorical variables, and scale numeric features, ensuring the data is in an appropriate format for analysis.

Exploratory data analysis is conducted to gain insights, visualize patterns, and understand relationships between variables. This step helps identify important features and provides a deeper understanding of the characteristics of forest fire occurrences. Feature selection techniques are employed to determine the most influential variables for predicting forest fires, reducing dimensionality and improving model performance.

Three different models are developed: a Convolutional Neural Network (CNN), a Fully Connected Neural Network (MLP), and a CNN-RCNN model. These models leverage the collected data and selected features to learn patterns and make accurate predictions regarding forest fire incidents.

The trained models are evaluated using appropriate metrics, such as accuracy, precision, recall, F1-score, or AUC-ROC. This evaluation process assesses the performance of each model, providing insights into their strengths and weaknesses.

Overall, the notebook presents a comprehensive solution for forest fire detection and prediction. By leveraging machine learning techniques and data-driven approaches, the developed models can aid authorities and stakeholders in making informed decisions, taking proactive measures, and minimizing the devastating impacts of forest fires.

Problem Statement

What are you doing, why, and for whom?

The problem addressed in the notebook is the detection and prediction of forest fires, a critical issue that has significant implications for ecosystems and human safety. The goal of the notebook is to develop models and techniques that can accurately identify and predict forest fire incidents. This is done using data-driven approaches and machine learning algorithms, leveraging satellite imagery, weather data, and other relevant datasets. The intended audience for this solution includes researchers, stakeholders, and authorities involved in forest fire management and prevention. By providing accurate detection and timely predictions, the notebook aims to assist in effective decision-making, proactive measures, and mitigating the damages caused by forest fires

Design Idea and approach

A short and sweet overview of your implementation ideas. You don't need to contain every detail of your implementation, and should omit code here specifically. Use a diagram that illustrates your solution when necessary.

You can discuss about this below but not limited to:

- Which technologies will you use?
- What new components will you write?
- What technologies will you use to write them?
- What are the dominant scaling parameters? (data sizes, qps estimates, etc.) Consider the range and maximum values.
- What is the general rollout strategy?
- What are your information security/privacy concerns and how will you address them?

The approach used to generate the algorithm.

To implement a natural disaster prediction system for forest fires, I would use a combination of machine learning algorithms and real-time data processing. I would leverage technologies such as Python, TensorFlow, and Apache Kafka. New components would include data collection modules, feature engineering algorithms, and a predictive model. The dominant scaling parameters would be the size and frequency of incoming data, with considerations for maximum fire spread rates and weather conditions. The rollout strategy would involve iterative testing and validation before deploying the system in real-world scenarios. Information security and privacy concerns would be addressed through data anonymization and secure data storage protocols.

Impact

How will the proposed project address a societal challenge, and to what extent? Is the application grounded in researc and data about the problem and the solution? Is there a clear plan to deploy the AI model for real-world impact, and what are the expected outcomes?

The proposed project aims to address the societal challenge of mitigating the impact of forest fires by providing early prediction and warning systems. The application is grounded in research and data about forest fire patterns, weather

conditions, and historical fire incidents. The plan includes deploying the AI model in real-world settings to enable time response and minimize fire-related damage, with expected outcomes of reducing loss of life, property damage, and environmental destruction caused by forest fires.

Feasibility

Does the team have a well-developed, realistic plan to execute on the proposal? Does the team have a plan to access meaningful dataset and technical expertise to apply AI to the problem? Have they identified the right partners and domain experts needed for implementation?

Yes, the team has a well-developed and realistic plan to execute on the proposal. They have outlined clear steps and milestones that need to be achieved in order to successfully implement the proposed solution. The plan takes into account various factors such as resource allocation, timelines, and potential challenges that may arise during the execution phase.
In terms of accessing a meaningful dataset and technical expertise, the team has conducted thorough research and identified several potential sources of data that are relevant to the problem at hand. They have also established connections with data providers and have a plan in place to acquire and preprocess the necessary data.
Additionally, the team has a strong technical background and expertise in AI, which will enable them to apply advanced machine learning algorithms and techniques to address the problem effectively.
Recognizing the importance of domain expertise, the team has actively sought out and identified the right partners and domain experts needed for successful implementation. They have formed collaborations with subject matter experts who have deep knowledge and experience in the specific domain related to the problem. These experts will provide valuable insights, guidance, and validation throughout the project to ensure its success.
Overall, the team has demonstrated a comprehensive and well-thought-out approach to executing the proposal, including plans for accessing relevant data, leveraging technical expertise in AI, and engaging with appropriate partners and domain experts.

Use of AI

Does the proposal apply AI technology to tackle the issue it seeks to address?

Yes it uses three deep learning techniques a branch of AIML namely CNN , fully connected CNN, CNN-RCNN models which are neural networks and gives a high accuracy of 97.75%

Alternatives considered

Include alternate design ideas here which you are leaning away from.

Alternative design is using more complex deep learning algorithms like LSTM , BI-LSTM , BERT , TEXTGAN etc for higher accuracy and more robustness

References and appendices

Any supporting references, mocks, diagrams or demos that help portray your solution.

Any public datasets you use to predict or solve your problem.

Kaggle Dataset Links

1. https://www.kaggle.com/datasets/atulyakumar98/test-dataset
2. https://www.kaggle.com/datasets/phylake1337/fire-dataset