**Project Initialization and Planning Phase**

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| Date | 28/6/24 |
| Team ID | SWTID1720100721 |
| Project Title | Machine Learning Approach To Predict Price of Natural Gas |
| Maximum Marks | 3 Marks |

**Project Proposal (Proposed Solution) template**

This project proposal outlines a solution to address a specific problem. With a clear objective, defined scope, and a concise problem statement, the proposed solution details the approach, key features, and resource requirements, including hardware, software, and personnel.

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| **Project Overview** | |
| Objective | To develop a machine learning model that accurately predicts future natural gas prices based on historical data and relevant market factors. |
| Scope | This project focuses on building a model that utilizes historical natural gas prices, weather data, production data, and other relevant economic indicators to predict future natural gas prices within a specified timeframe. |
| **Problem Statement** | |
| Description | The price of natural gas is influenced by various factors including supply and demand dynamics, weather conditions, geopolitical events, and economic activity. Predicting future natural gas prices is crucial for businesses and consumers to make informed decisions and manage risks. |
| Impact | Accurate price predictions can help:   * **Energy companies:** Optimize production and trading strategies. * **Utilities:** Forecast demand and manage inventory. * **Consumers:** Make informed purchasing decisions and hedge against price fluctuations. |
| **Proposed Solution** | |
| Approach | The project will utilize a supervised machine learning approach with the following steps:   1. **Data Collection and Preprocessing:** Gather historical data on natural gas prices, weather patterns, production levels, and relevant economic indicators. Preprocess the data to ensure consistency and handle missing values. 2. **Feature Engineering:** Select and engineer relevant features from the collected data to improve the model's performance. 3. **Model Selection and Training:** Choose an appropriate machine learning algorithm (e.g., linear regression, support vector machines, or neural networks) and train the model on the preprocessed data. 4. **Model Evaluation and Optimization:** Evaluate the model's performance using appropriate metrics (e.g., accuracy, mean absolute error) and optimize the model parameters for better prediction accuracy. 5. **Deployment:** Deploy the trained model to provide real-time natural gas price predictions. |
| Key Features | * **Multi-variable analysis:** Incorporate multiple influencing factors to enhance prediction accuracy. * **Time series modeling:** Utilize time series techniques to capture temporal dependencies in the data. * **Model optimization:** Employ hyperparameter tuning and other optimization techniques to improve model performance. |

**Resource Requirements**

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| **Resource Type** | **Description** | **Specification/Allocation** |
| **Hardware** | | |
| Computing Resources | CPU/GPU specifications, number of cores | 2 x NVIDIA V100 GPUs |
| Memory | RAM specifications | 8 GB |
| Storage | Disk space for data, models, and logs | 1 TB SSD |
| **Software** | | |
| Frameworks | Python frameworks | Flask |
| Libraries | Additional libraries | scikit-learn, pandas, numpy |
| Development Environment | IDE, version control | Jupyter Notebook, Git |
| **Data** | | |
| Data | Source | Kaggle dataset |