**Title of the Project**: AIR QUALITY PREDICTION USING MACHINE LEARNING

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ABSTRACT

Air quality forecasting has become an essential task for environmental monitoring and public health management due to the increasing levels of urban pollution. The dataset comprises over 164,000 hourly samples collected from 10 monitoring stations in Tashkent over three years, along with satellite features such as Aerosol Optical Depth (AOD) and vegetation indices. Preprocessing techniques including KNN imputation, normalization, and feature engineering were applied to improve data quality. Multiple algorithms were evaluated, including Decision Trees, Random Forests, Support Vector Machines, and Artificial Neural Networks. While the existing system demonstrates high accuracy using Random Forests and ANN, the proposed system enhances scalability to handle double the dataset size and integrates satellite observations for improved spatial coverage. Experimental results show that ensemble methods (CatBoost/LightGBM) and temporal deep learning models (LSTM/Transformers) can achieve robust performance in both AQI prediction and APC classification. This study highlights the potential of hybrid machine learning approaches in providing reliable and scalable air quality forecasting solutions.