An IoT-Enabled Crop Recommendation System Utilizing Message Queuing Telemetry Transport (MQTT) for Efficient Data Transmission to AI/ML Models

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Abstract : In the modern agricultural landscape, precision farming has emerged as a pivotal strategy for enhancing crop yield and optimizing resource utilization. This paper introduces an innovative Crop Recommendation System (CRS) that leverages the Internet of Things (IoT) technology and the Message Queuing Telemetry Transport (MQTT) protocol to collect critical environmental and soil data via sensors deployed across agricultural fields. The system is designed to address the challenges of real-time data acquisition, efficient data transmission, and dynamic crop recommendation through the application of advanced Artificial Intelligence (AI) and Machine Learning (ML) models. The CRS architecture encompasses a network of sensors that continuously monitor environmental parameters such as temperature, humidity, soil moisture, and nutrient levels. This sensor data is then transmitted to a central MQTT server, ensuring reliable and low-latency communication even in bandwidth-constrained scenarios typical of rural agricultural settings. Upon reaching the server, the data is processed and analyzed by AI/ML models trained to correlate specific environmental conditions with optimal crop choices and cultivation practices. These models consider historical crop performance data, current agricultural research, and real-time field conditions to generate tailored crop recommendations. This implementation gets 99% accuracy.