

ABSTRACT

In today's digital era, the demand for automated systems that enhance efficiency and accuracy in industrial processes is becoming increasingly critical, particularly in the assessment of raw materials such as sugarcane. PT SGN PG JATIROTO faces challenges in manually evaluating sugarcane quality, which is often inaccurate and affects overall productivity. This research aims to design a full-stack application for sugarcane quality prediction using deep learning, integrated with CCTV-based monitoring through an Iterative Incremental development method. The system enables Real-time quality monitoring via IoT CCTV Cameras, which are connected to a deep learning model to generate automated predictions. The Backend is implemented and MySQL. Development is carried out in two Iterative Incremental phases to ensure the system adapts to operational field requirements. The results indicate that the developed system significantly improves the accuracy of sugarcane quality assessment, accelerates decision-making processes, and minimizes errors in raw material classification. API testing shows an average response time of 318 milliseconds with a 0% error rate, demonstrating the system's readiness for production-scale deployment. This research is expected to contribute to the modernization of the sugar industry in Indonesia through an efficient, AI-based technological solution. In addition, the load testing results on the GPU device showed a usage consumption of 57% with 3.3 GB of VRAM utilized out of a total of 4 GB, confirming that the system can run stably on standard hardware specifications without requiring significant infrastructure investment.

Keywords : *Full-Stack, Iterative Incremental, PyQt, API, Integrations.*