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**CropWise**

**Abstract**

While the agricultural sector has seen much improvement in developed countries, many underdeveloped countries are still struggling to sufficiently mechanize and improve their crop yields. In many rural or underdeveloped areas, farmers often rely on outdated methods or "trial and error" for farming practices and this has resulted in reduced food production leading to hunger and wide spread famines in the event of natural disasters. In alleviating this issue in developing countries I introduce CropWise which is a data-driven Smart Agriculture Management Platform that leverages artificial intelligence and machine learning to help farmers optimize crop production and resource management. By utilizing various datasets, such as soil quality, weather patterns, and crop performance, the platform provides real-time insights, predictive analytics, and tailored recommendations on irrigation, fertilization, pest control, and crop rotation. With a user-friendly interface and backend infrastructure built on C#, SQL, and cloud technologies, CropWise enables farmers to make informed decisions that improve productivity, reduce waste, and enhance sustainability platform's data-driven insights will allow farmers to make informed decisions, even in the absence of expert consultation.

On the backend, data which will be pulled from reputable sources online will be processed, cleaned and stored in the database which will be running using google cloud services, Hadoop as well as pyspark. C# will serve as the core of the CropWise platform handling business logic, and interactions with databases and external APIs. C# is a powerful, object-oriented programming language that excels in building scalable, high-performance applications, making it good for developing a robust backend system. In CropWise, C# would manage the integration of agricultural data, perform complex analytics, and handle AI-driven recommendations for crop management. The backend would utilize ASP.NET Core to build RESTful APIs that facilitate communication between the user interface and the database, enabling real-time data updates and ensuring seamless user experiences.

Generative AI will be utilized in the generation of the reports to be presented to the farmers. I will also use interactive dashboard to visualize key metrics such as soil moisture levels, crop health, and weather trends. Display maps showing field divisions with overlays for soil and crop data will also be used.

There will be much use of real-time data to inform farmers. Based on data from the region (like climate, soil type, and historical yields), the platform generates personalized crop rotation plans, advising farmers on which crops to plant in each season to optimize productivity while minimizing environmental impact.

In the future, the platform can be expanded to support local cooperatives or community-based farming efforts. By pooling resources and data, farmers in underdeveloped countries can share insights, compare performance, and collaborate on achieving greater agricultural success