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Where AI Dives Deep, Cultivating Smart Aquaculture

Abstract

Our research and development project introduces an innovative solution tailored for business-to-business (B2B) users focusing on sustainable organic farming in Pakistan by integrating aquaculture. It addresses agriculture sector challenges, optimizing soil health and fish farming. Utilizing smartphone cameras, the system accurately identifies soil types and fish species, providing comprehensive insights via a web app. The methodology employs artificial intelligence, deep learning, and computer vision to promote economic growth through a symbiotic relationship between agriculture and aquaculture. By synergizing soil and fish species classification, it creates a nutrient-rich fish fertilizer, enhancing soil fertility sustainably. The automated system offers a feasible solution for sustainable organic farming in Pakistan, promoting intelligent agricultural practices and environmentally friendly outcomes.

Objectives

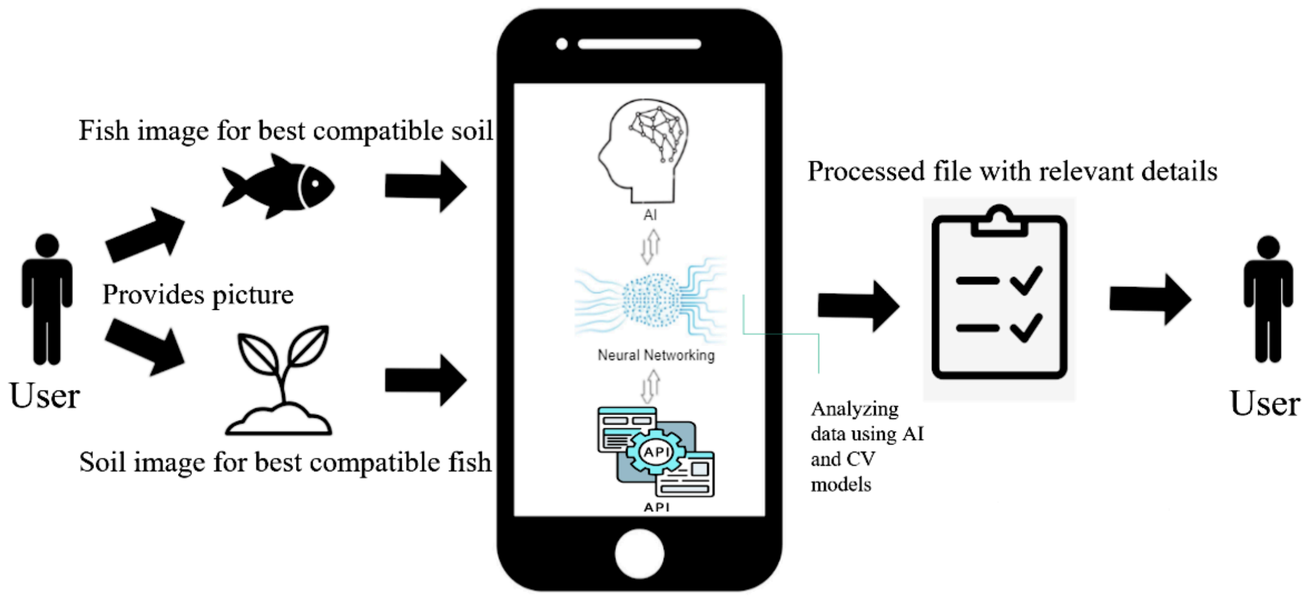
1. Develop an integrated AI-driven solution for sustainable organic farming practices in Pakistan.
2. Implement state-of-the-art transfer learning models for soil and fish species identification and compatibility assessment.
3. Incorporate data scraping techniques to collect datasets of different types of halal-haram fishes.
4. Consult field experts to ensure the compatibility of fishes and soil with each other.
5. Utilize a Language Model (LLM) for fish nutrient extraction recommendations.
6. Document the entire project lifecycle, including LR, SRS, SDS, and an IEEE Paper.
7. Conduct thorough testing and evaluation to validate the system's functionality, performance, and usability.

Tools used

React, BeautifulSoup, Node.js, Selenium 4, Flask, CherryPy, TensorFlow, Hugging Face, Microsoft Phi-3, python

Methodology

Our methodology involves data collection of soil types and fish species, training transfer learning models, developing data scraping techniques and consulting field experts for accuracy. We utilize a Language Model (LLM) for nutrient extraction recommendations and document the project comprehensively. Thorough testing and evaluation were conducted to ensure functionality and accuracy, making our solution ready for integration into sustainable farming practices of Pakistan.



Dataset

(1) Halal Fish (2) Haram Fish (3) Saline Soil (4) Mix Soil (5) Alkaline Soil

UI & Results