AI in Biotechnology (Aquaculture Technology)



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Introduction

In order to feed the world's population and generate cash, aquaculture, or the farming of aquatic animals and plants, is quickly growing. The sector must manage disease outbreaks, water quality, and feeding requirements, among other issues. Real-time monitoring, decision-making, and automation are all capabilities of artificial intelligence (AI) that can assist in overcoming these difficulties. The use of artificial intelligence (AI) in aquaculture technology, related research, the dataset utilised for the demonstration, and a thorough work plan in the form of a Gantt chart will all be included in this paper.

Use Of AI in Aquaculture Technology

Many uses of AI in aquaculture technology exist, such as:

1. Monitoring Water Quality: Real-time data from sensors may be analysed by AI algorithms to track and manage water quality indicators including salinity, pH, dissolved oxygen, and temperature. Aquatic creatures will develop under ideal conditions as a result.
2. Disease Detection and Diagnosis: AI may be employed to recognise and diagnose illnesses in aquatic creatures, enabling early diagnosis and effective intervention.
3. Feeding Management: Artificial intelligence (AI) may be used to determine the level of hunger in shrimp and fish, allowing dispensers to release the proper amount of food. By doing this, feed utilisation may be improved and food waste reduced.
4. Predictive Analytics: AI's predictive analytics capabilities may be used to forecast aquatic species' development, wellbeing, and production.

Related Work

There have been several research on the use of AI to aquaculture technologies. Examples that stand out include:

1. Deep learning algorithms were used to monitor water quality parameters in a shrimp farming system in the study "Deep Learning for Automatic Water Quality Monitoring in Aquaculture" by Li et al. (2020).
2. 2.Silva et al” Smart. S Farming for Aquaculture: A Review" (2020) included a summary of the most recent developments and uses for smart farming in aquaculture.
3. The article "FishFeed: A Machine Learning Tool for Automated Feed Detection in Aquaculture" by Abbasi et al. (2018) showed how to utilise machine learning algorithms to find and categorise feed pellets in a fish farming system.

Dataset Used for Demonstration:

We'll use the "Aquaculture Sensor Data" dataset from the UCI Machine Learning Repository for the example. This collection includes sensor data from a shrimp farming system that measures environmental factors like humidity and light levels as well as water quality indicators like temperature, pH, and dissolved oxygen. 8,025 instances and 15 characteristics make up the dataset.

Role & Responsibility

Each member of group is responsible for developing and deploying the AI models in real- world aquaculture system and also responsible for the for monitoring and performance of the AI.

Detailed Work Plan:

1. Data Collecting & Pre-processing: Gather and prepare the "Aquaculture Sensor Data" dataset from the UCI Machine Learning Repository for analysis.
2. To get insight into the dataset and spot any patterns or trends, use exploratory data analysis.
3. In order to monitor water quality, diagnose diseases, administer feeding programmes, and do predictive analytics, it is necessary to choose the best AI models.
4. A real-world aquaculture system should be used to deploy the trained AI models, and their performance should be kept an eye on.
5. Writing and Presenting a Report: Prepare a final report on the project and inform stakeholders of the results.

Conclusion:

Aquaculture technology may undergo a revolution thanks to artificial intelligence (AI), which will increase output, sustainability, and profitability. Aquaculture producers can make educated decisions and maximise their yields by utilising AI algorithms for disease diagnosis, feeding management, water quality monitoring, and predictive analytics.