

Project Design Phase-I Solution Architecture

Date	19 September 2022
Team ID	PNT2022TMID46542
Project Name	FERTILIZERS RECOMMENDATION SYSTEM FOR DISEASE PREDICTION
Maximum Marks	4 Marks

Solution Architecture:

Detection and recognition of plant diseases using machine learning are very efficient in providing symptoms of identifying diseases at its earliest. Plant pathologists can search the digital images using digital image processing for diagnosis of plant diseases. Application of computer vision and image processing strategies simply assist farmers in all of the regions of agriculture. Plant diseases are caused by the abnormal physiological functionalities of plants. Therefore, the characteristic symptoms are generated based on the differentiation between normal physiological functionalities and abnormal bacteria, virus, or other microorganisms that can cause disease. Functionalities of the plants. Mostly, the plant leaf diseases are caused by Pathogens which are positioned on the stems of the plants. These different symptoms and diseases of leaves are predicted by different methods in image processing. These different methods include different fundamental processes like segmentation, feature extraction and classification and so on. Mostly, the prediction and diagnosis of leaf diseases are dependent on the segmentation such as segmenting the healthy tissues from diseased tissues of leaves.

Devices, new project management tools and fast, transparent file sharing has changed the way we look at teamwork. By embracing new technology and digital innovations, a whole host of barriers to efficiency and business problems can be solved by technology.

The Convolutional layers are used to classify and process the images and further help in recommending the fertilizers. The image classification steps are

- Image acquisition
- Preprocessing
- Segmentation
- Disease Prediction
- Fertilizer Recommendation

Insights and customer communication:

One of the most important things for a business to have is insight into its customers and audience. Knowing who you are talking to, and who you want to talk to, is the first step in marketing, design, R&D, and almost every other aspect of a successful company. New innovations in data gathering, analytics and digital insights mean that modern businesses have an unprecedented amount of information about their current and potential customers at their fingertips.

Security:

Solving problems with technology can also be about preventing problems in the first place. New tech like artificial intelligence and machine learning can make a huge difference when it comes to cyber security, and organizations that embrace this can protect themselves far more effectively against an increasingly sophisticated and dynamic breed of cyber criminal.

Cloud services:

Cloud is changing the way you do business. As a cloud computing services provider, we can migrate your technology to the cloud, integrate your cloud and on-premise technology into a hybrid solution, and train your people on the cloud. With over 25 years in the IT industry, CompuVision is a pioneer in cloud service integration and management.

Challenges:

At the beginning of the 19th century, there were almost no man-made nitrogen compounds in the environment. But in the years after the Haber-Bosch breakthrough, their levels began to skyrocket, driven by the massive uptake of synthetic fertilizers and other human activities like the manufacturing of munitions and the burning of fossil fuels, both of which create chemically reactive forms of nitrogen.

Nutrient run-off from farms laced with synthetic fertilizer has adversely affected land ecosystems, according to the United Nations-backed Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES). But freshwater and marine habitats have been hit hardest, with recurrent algal blooms such as in Lake Erie, and “dead zones” left of aquatic life as in the Gulf of Mexico, it says.

Human health is also at risk. Agricultural ammonia emissions can combine with pollution from vehicle exhausts to create dangerous particulates in the air and exacerbate respiratory diseases, including COVID-19. One study has estimated that air pollution may increase mortality associated with COVID-19 by 15 per cent.

To stem the tide of nitrogen pollution, a growing number of governments, companies and international bodies, including the United Nations Environment Programme (UNEP), have been working with scientists to better understand the risks associated with human use of nitrogen, and to raise awareness.

To that end, almost exactly a year ago United Nations Member States endorsed an ambition to halve nitrogen waste from all sources by 2030. UNEP also recently established the global “Halve Nitrogen Waste” campaign, highlighting the fact that improving nitrogen use efficiency not only supports climate, nature and health goals but also (an estimate based on half the value of global synthetic fertilizer sales).

Solution:

Globally, synthetic fertilizers are behind the bulk of global food production and they’re especially important in developing countries. That, experts say, will make a transition away from them challenging. However, initiatives to stake out a more sustainable way of growing food are plentiful.

A recent article from the Soil Association, a United Kingdom-based charity and advocate of organic farming, calls for much greater attention to nitrous oxide emissions in global greenhouse gas accounting; more integrated efforts to tackle nitrogen excess as a climate, nature and health issue; and incentives for better nitrogen management at farm level.

But organic farming methods are not the only example of sustainable nutrient management: including conservation, low-input, and minimum tillage agriculture, are all recognized as “nature-positive” and regenerative practices.

From farm to fork, 80 percent of nitrogen is wasted and lost to the environment. according to a study by the Centre for Ecology & Hydrology in the United Kingdom. More efficient use of animal manure and greater use, in rotations, of nitrogen-fixing crops – such as legumes which convert nitrogen from the air into a form that is biologically useful – will be crucial to replace synthetic nitrogen as part of the process of rebuilding soil fertility.

There is consensus that everyone should be using manure and urine better, says Mark Sutton, a lead author of the study. “Simple actions include putting a lid on the manure tank, which stops ammonia being lost to air. If you can smell your manure, it means you are wasting it in the atmosphere,” he says.

“Financial incentives and political buy-in will be necessary to overcome the many obstacles in the way of nitrogen-light farming methods,” says Susan Gardner, head of the UNEP Ecosystems Division. “But the bottom line remains: we need to dramatically reduce the quantity

of reactive nitrogen being released into the environment from all sources, especially from synthetic fertilizers which represent one of the biggest nitrogen flows.”

“The sustainable use of nitrogen offers a triple win – for the economy, for human health, and for the environment,”.

The International Nitrogen Management System (INMS) is a global science-support system for international nitrogen policy development established as a joint activity of UNEP and the International Nitrogen Initiative.

Structure:

The fertilizer recommender calculates all of the fertilizer combinations that will suit the crop's needs at the lowest cost. Farmers can use the web to access the system.

Characteristics:

A good quality, Free-flowing (easily applied) Consistent in particle size with smooth and hard granules. Easily spread – ensuring even distribution patterns. Quickly dissolve when in contact with moist soil or water (avoid run-off) Free from contaminants and additives.

Aspects of software:

The software requires farmer field location, respective soil and land type, and crop type and variety information to generate crop-specific instant fertilizer recommendations.

Specification and delivered:

We propose an architectural model aid in deploying a smart farming system with limited energy consumption. Moreover, focusing on the application layer, we implement a deep learning approach to build a fertilizer recommendation system that matches the expert's opinion.

Solution Architecture:

