Center For Artificial Intelligence

Dr. B.R. Ambedkar National Institute of Technology, Jalandhar

Report on Expert Talk Lecture

Date: 27/08/2024

Time: 10:00am-12:00am

Topic: Breast Cancer Analysis: Problems of Clinical Interest and AI Challenges

Speaker: Dr. Amit Agarwal, Professor, Electrical & Electronics Engineering, Amrita Vishwa Vidyapeetham

Venue: NKN Center, IT Building

Introduction

The expert lecture on “Breast Cancer Analysis: Problems of Clinical Interest and AI Challenges” was organized by the Center for Artificial Intelligence. The talk was given by Dr. Amit Agarwal, Professor, Electrical & Electronics Engineering, Amrita Vishwa Vidyapeetham. His skill is recognized in various industries, including financial institutions, medical imaging, and artificial intelligence. He is working tirelessly to digitize agriculture with AI technologies.

It was organized with the focus to transfer the knowledge directly from the people who mastered the technologies to the students of MTech AI.

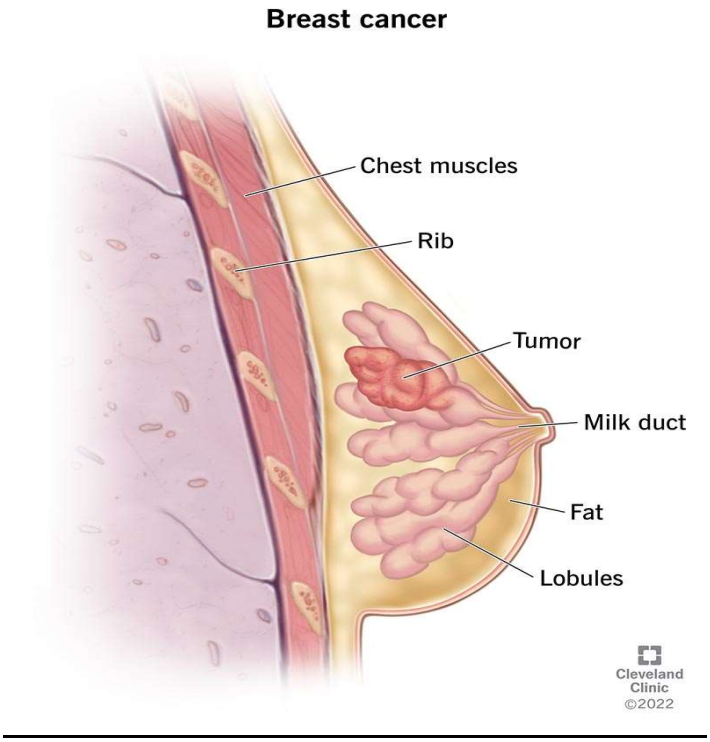
Overview of the Topic

The presentation was well-structured, beginning with an overview breast cancer analysis, exploring both clinical challenges. He mentioned that India has about 100,000 fatalities from breast cancer annually, and that there are 5.4 million new instances of breast cancer and 670,000 cancer deaths worldwide. The conversation then shifts to the revolutionary possibilities of AI in improving tailored medicine, early diagnosis, and detection. At the end it was a fruitful session for the budding engineers of Nit Jalandhar.

Challenges in Clinical Breast Cancer Analysis

Dr. Agarwal noted several clinical difficulties in the diagnosis of breast cancer. The high percentage of false positives and false negatives connected to present diagnostic techniques is one of the main obstacles. False negative results can cause therapeutic delays that negatively impact the prognosis of the patient, while false positives can result in needless biopsies and psychological discomfort. He also talked about how different tumours show differently, making it more difficult to create uniform diagnostic procedures.

The diversity of breast cancer was identified as another important obstacle. The molecular and genetic composition of tumours can range greatly, resulting in varying responses to treatment. Because of this variety, physicians must create individualized treatment strategies, which adds complexity to the diagnosis and management of breast cancer.



Ongoing Projects

Dr. Agarwal closed the lecture with an overview of active breast cancer research projects:

- Non-Invasively Assess NAC Response from Longitudinal Images and Clinical Risk Factors
- Validation & Recalibration of MIRAI Personalized Screening Model
- Breast Density Estimation Model
- Non-Invasively Assess Tumour Aggressiveness & Natural History
- ROI and Segmentation Analysis

Conclusion

Dr. Amit Agarwal's lecture on "Breast Cancer Analysis: Clinical Interest Problems and AI Challenges" was a thorough examination of AI's possibilities in healthcare. It emphasized the relevance of technology innovation in enhancing patient outcomes while addressing the ethical and practical issues of AI incorporation.

Center For Artificial Intelligence

Dr. B.R. Ambedkar National Institute of Technology, Jalandhar

Report on Expert Talk Lecture

Date: 27/08/2024

Time: 2:00PM-4:00PM

Topic: Digital Agriculture: Problems and AI Challenges

Speaker: Dr. Amit Agarwal, Professor, Electrical & Electronics Engineering, Amrita Vishwa Vidyapeetham

Venue: NKN Center, IT Building

Introduction

The expert lecture on “Digital Agriculture: Problems and AI Challenges” was organized by the Center for Artificial Intelligence. The talk was given by Dr. Amit Agarwal, Professor, Electrical & Electronics Engineering, Amrita Vishwa Vidyapeetham. His skill is recognized in various industries, including financial institutions, medical imaging, and artificial intelligence. He is working tirelessly to digitize agriculture with AI technologies.

It was organized with the focus to transfer the knowledge directly from the people who mastered the technologies to the students of MTech AI.

Overview of the Topic

Dr. Agarwal discussed how the French National Institute for Agriculture, Food, and Environment (INRAE) advances agricultural research. He stressed the need to address the difficulties brought by climate change, notably the increasing number of dry days, which negatively affects crop water availability.

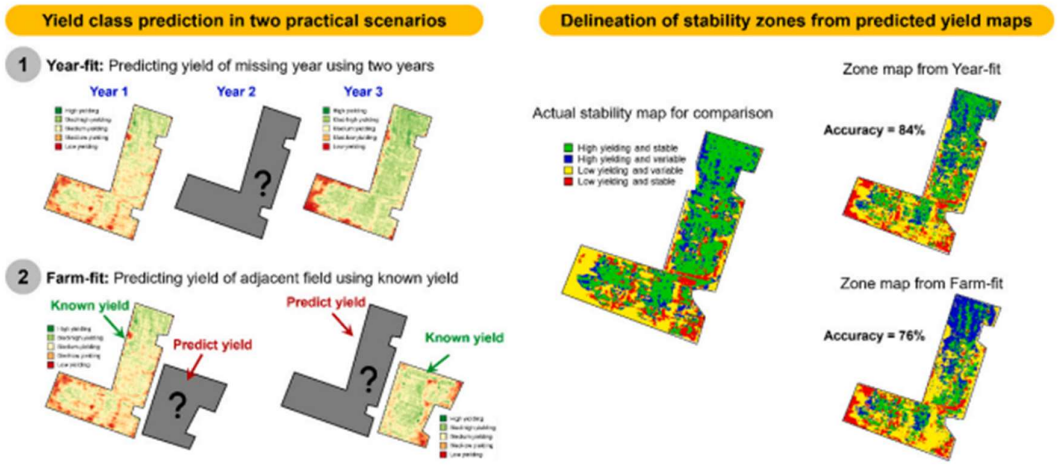
Dr. Agarwal described the study's methodology, which uses capacitive probes inserted at various depths to continuously assess the moisture content of the soil in orchards. This is essential for comprehending the dynamics of soil moisture and efficiently managing water supplies.

The Copernicus Program: Sentinel 1 & 2

The Copernicus Program and its two main satellites, Sentinel 1 and Sentinel 2, were introduced by Dr. Agarwal:

- Sentinel 1: With a pixel resolution of 10 meters, this 6-day operational radar equipped with radar bands delivers vital information on crop conditions and soil moisture.
- The second sentinel: In addition, this satellite, which has a 5-day rotation, provides optical imaging to evaluate environmental conditions and crop health in addition to Sentinel 1 data.

Because they provide real-time data that is essential for decision-making, these satellites play a critical role in monitoring and controlling agricultural practices.



GRAPHICAL ABSTRACT

Modelling Surface Soil Moisture and Water Stock

The following actions were emphasized as being crucial to modelling surface soil moisture and water stock:
1. Linear Regression with Variable Selection: Sentinel 1 (VV, VH, ZA) and Sentinel 2 (FCover, RI) are used in stepwise regression.
2. Machine Learning Techniques: Support Vector machines and Random Forest (SVM) using data from nearby stations for Sentinel 1 SWI (1 km) and Sentinel 2 Rainfall. Surface soil moisture, water stock (0–50 cm), and daily ground readings are among the variables that need to be forecast. The models are currently trained using a 50/50 balanced method.

Conclusion

Digital agriculture provides a transformative potential to address the mounting concerns of food security and sustainability. Farmers may increase crop yields, reduce environmental impact, and enhance overall efficiency by utilizing satellite imaging and artificial intelligence. Several problems and limitations must be overcome before digital agriculture may fully realize its potential. With ongoing research, innovation, and politicians' support, digital agriculture has the potential to become a cornerstone of modern farming, contributing to a more sustainable and food-secure future.

Submitted by: Nilanshu Nilay

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