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GUEST LECTURE ORGANISED BY DEPARTMENT OF PHYSICS 2024-2025

"Decoding materials genome: Insights of structure property correlation with machine learning"

The Department of Physics has organised a guest lecture entitled "Decoding materials genome: insights of structure property correlation with machine learning". The event was conducted on 24.03.2025 in the auditorium. The event started at 10.00 am and ended at 12.30 pm.

Dr Debalina introduced the guest and delivered the welcome address.

Optimisation is a key aspect of engineering, as it helps engineers develop efficient solutions under given constraints. Traditional optimisation methods can struggle with complex problems, especially when the solution space is vast, nonlinear, or poorly understood. Evolutionary algorithms (EAs) offer a robust alternative, using biologically inspired mechanisms to evolve solutions to optimisation problems.

In EAs, each individual in the population is represented by a genome. The genome is a string that encodes the parameters or variables of a solution. For example, in an engineering design problem, the genome could represent the dimensions of a mechanical part, the configuration of a power system, or the layout of a circuit.

The process of ‘decoding’ the genome involves evaluating the fitness of each individual based on its performance according to the objective function (e.g., minimising cost, maximising efficiency). Over successive generations, the algorithm evolves better solutions by optimising the genes in the genome.

For instance, if we are optimising a mechanical part design, the genes might represent the dimensions of various components. Through evolution, the algorithm explores different configurations, decoding the best combination of genes to achieve an optimal design. Dr Kaustav explained these basics with very basic examples so that students can understand easily.

At the end the guest was felicitated by a bouquet by Dr Sathish S, with a vote of thanks.

Outcome of the Event

The participants had a good opportunity to identify and enhance their domain knowledge in the field of programming and were motivated to learn more on various applications of the field.