

## **Seminar 6 Summary: Adaptive Algorithms and Deep Learning**

*In this session, Dr. Stelios Sotiriadis introduced adaptive algorithms, with a focus on Artificial Neural Networks (ANNs) and Deep Learning, which are at the forefront of AI innovation.*

### **Key Points Covered in the Seminar:**

- **What Are Adaptive Algorithms?**

*Adaptive algorithms are learning systems capable of improving their performance over time by adjusting internal parameters based on data. They are particularly powerful in complex pattern recognition tasks.*

- **Artificial Neural Networks (ANNs):**

*ANNs mimic the human brain's structure and learning process. They consist of interconnected nodes (neurons) organized in layers—input, hidden, and output—and are trained using large datasets to detect patterns and make predictions.*

- **Deep Learning:**

*A subfield of machine learning, deep learning uses deep neural networks (DNNs) with multiple hidden layers. It excels in handling high-dimensional data like images, speech, and text.*

- **Applications of Adaptive Algorithms:**

*Key real-world applications include:*

- *Image and speech recognition*
- *Autonomous vehicles*
- *Predictive analytics*
- *Recommendation systems*
- *Fraud detection*

- **Strengths and Weaknesses:**

*Dr. Sotiriadis emphasized that while deep learning achieves high accuracy and scalability, it demands massive computational resources and large labeled datasets. Moreover, model interpretability and ethical concerns remain ongoing challenges.*

- **Opportunities and Impacts:**

*Adaptive algorithms open new frontiers in healthcare, education, finance, and creative industries. However, issues of bias, transparency, and explainability must be addressed to ensure responsible AI deployment.*

*The seminar concluded by underlining the importance of mastering adaptive algorithms as a foundation for future AI systems, especially intelligent agents that learn and adapt in dynamic environments.*