

# **Transformative Role of Machine Learning in Medical Diagnosis in the 21st Century**

**HOJJAT ADELI**

**The Ohio State University**

Machine learning (ML) is a key and increasingly pervasive technology in the 21<sup>st</sup> century. It is going to impact the way people live and work in a significant way. This lecture starts with an overview of the key ML concepts and different types of ML algorithms. In general, machine learning algorithms simulate the way brain learns and solves an estimation/recognition problem. They usually require a learning phase to discover the patterns among the available data, similar to the humans. An expanded definition of ML is advanced as algorithms that can learn from examples and data and solve seemingly intractable learning and unteachable problems, referred to as ingenious artificial intelligence (AI). Next, recent and innovative applications of ML in various fields and projects currently being pursued by leading high-tech companies such as Google, IBM, Uber, Baidu, Facebook, Pinterest, and Tesla are reviewed. Then, machine learning algorithms developed by the author and his associates are briefly described. Finally, examples of automated EEG-based diagnosis of various neurological and psychiatric disorders such as epilepsy, the Alzheimer's disease, Parkinson's disease, autism spectrum disorder, and Attention Deficit Hyperactivity Disorder (ADHD) developed by the authors and his associates over the past decade are presented.