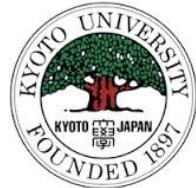Lecturer: Dr. Cristiano Giordani

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Abstract

Title: "Introduction to Neural Network research from a physicist's point of view"

Human brain is an electrical machine with surprising computing and elaboration capabilities. To date its functioning as a whole is almost unknown. Lately the scientific community has been intensifying the studies to reveal its secrets. Understanding how human brain works would open a new era in the history of human civilization and development. The purpose of this course is to provide an introduction on neural network research from a physicist's point of view. We will introduce the basic concepts for the neuron, membrane potential and the spike. We will talk about the pioneering studies of Hodgkin and Huxley on giant squid axons (Nobel Prize in 1963). We will see how to use software that allows us to create mathematical models for the simulation of membrane potential (Leaky Integrate-and-fire and Izikivich models). Least but not last we will introduce neuronal modeling for large networks of spiking neurons.