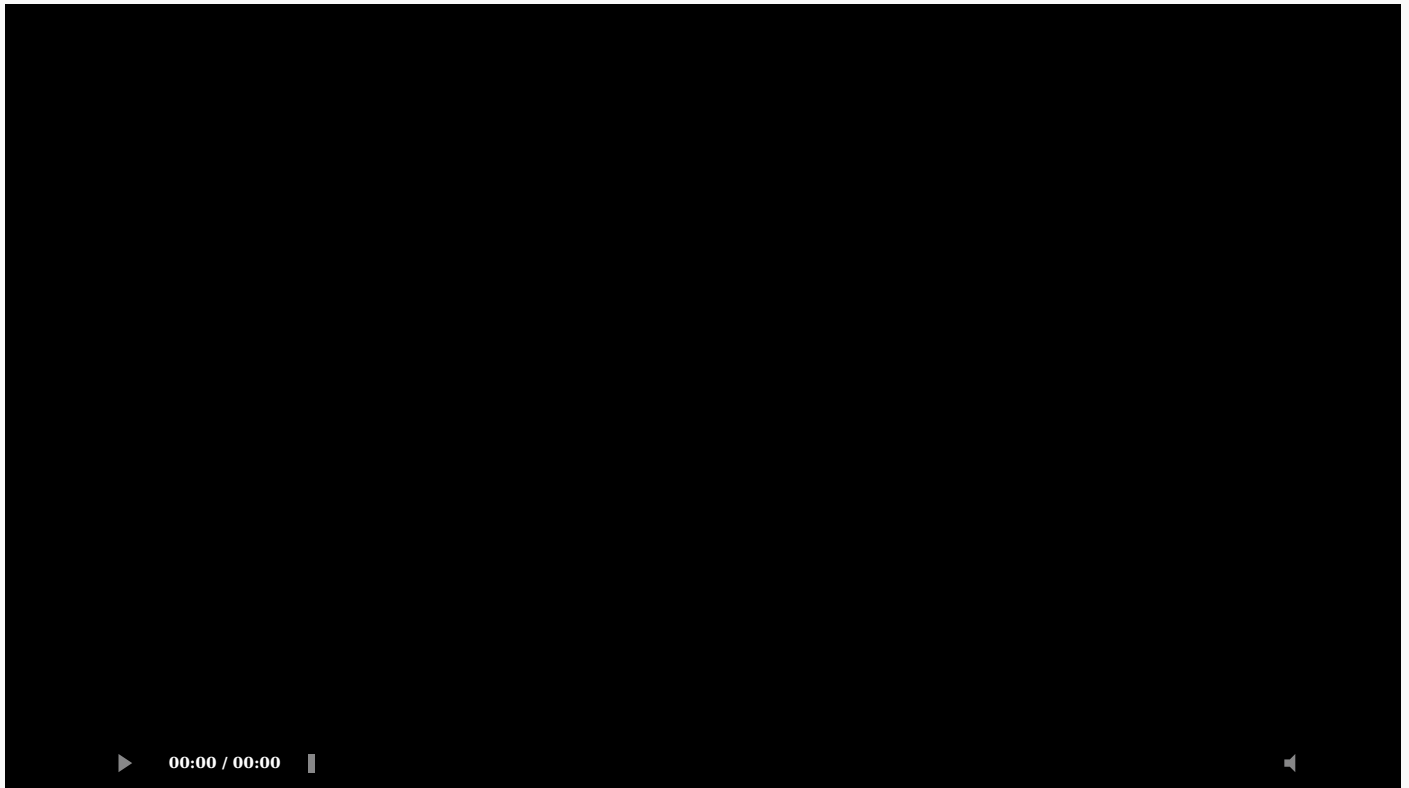




# Tutorial: Deep Learning



Deep Learning allows computational models composed of multiple processing layers to learn representations of data with multiple levels of abstraction. These methods have dramatically improved the state-of-the-art in speech recognition, visual object recognition, object detection, and many other domains such as drug discovery and genomics. Deep learning discovers intricate structure in large datasets by using the back-propagation algorithm to indicate how a machine should change its internal parameters that are used to compute the representation in each layer from the representation in the previous layer. Deep convolutional nets have brought about dramatic improvements in processing images, video, speech and audio, while recurrent nets have shone on sequential data such as text and speech. Representation learning is a set of methods that allows a machine to be fed with raw data and to automatically discover the representations needed for detection or classification. Deep learning methods are representation learning methods with multiple levels of representation, obtained by composing simple but non-linear modules that each transform the representation at one level (starting with the raw input) into a representation at a higher, slightly more abstract level. This tutorial will introduce the fundamentals of deep learning, discuss applications, and close with challenges ahead.

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**Speaker** Geoffrey E. Hinton, Yann LeCun, and Yoshua Bengio

**Host** NIPS 2015

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