TensorFlow: Learning Functions at Scale

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Abstract

TensorFlow is a machine learning system that operates at large scale and in heterogeneous environments. Its computational model is based on dataflow graphs with mutable state. Graph nodes may be mapped to different machines in a cluster, and within each machine to CPUs, GPUs, and other devices. TensorFlow supports a variety of applications, but it particularly targets training and inference with deep neural networks. It serves as a platform for research and for deploying machine learning systems across many areas, such as speech recognition, computer vision, robotics, information retrieval, and natural language processing.

In this talk, we describe TensorFlow and outline some of its applications. We also discuss the question of what TensorFlow and deep learning may have to do with functional programming. Although TensorFlow is not purely functional, many of its uses are concerned with optimizing functions (during training), then with applying those functions (during inference). These functions are defined as compositions of simple primitives (as is common in functional programming), with internal data representations that are learned rather than manually designed.

TensorFlow is joint work with many other people in the Google Brain team and elsewhere. More information is available at tensorflow.org.

Categories and Subject Descriptors C.2.4 [**Computer-Communication Networks**] Distributed Systems; D.1.3 [**Programming Techniques**] Concurrent Programming – Distributed Programming; I.2.6 [**Artificial Intelligence**] Learning

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Biography

Martín Abadi is a Principal Scientist at Google. He is also a Professor Emeritus at the University of California at Santa Cruz, where was a Professor in the Computer Science Department till 2013. He has held an annual Chair at the Collège de France, has taught at Stanford University and the University of California at Berkeley, and has worked at Digital's System Research Center, Microsoft Research Silicon Valley, and other industrial research labs. He received his Ph.D. at Stanford University in 1987. His research is mainly on computer and network security, programming languages, and specification and verification methods. It has been recognized with the Outstanding Innovation Award of the ACM Special Interest Group on Security, Audit and Control and with the Hall of Fame Award of the ACM Special Interest Group on Operating Systems, among other awards. He is a Fellow of the Association for Computing Machinery and of the American Association for the Advancement of Science (AAAS). He holds a doctorate honoris causa from École normale supérieure de Cachan.

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