



5 Courses

**Neural Networks and Deep Learning**

**Improving Deep Neural Networks: Hyperparameter Tuning, Regularization and Optimization**

**Structuring Machine Learning Projects**

**Convolutional Neural Networks**

**Sequence Models**



May 4, 2025

## Zubair Ali Bhutto

has successfully completed the online, non-credit Specialization

# Deep Learning

Congratulations! You have completed all 5 courses of the Deep Learning Specialization. In this Specialization, you built neural network architectures such as Convolutional Neural Networks, Recurrent Neural Networks, LSTMs, Transformers, and learned how to make them better with strategies such as Dropout, BatchNorm, and Xavier/He initialization. You mastered these theoretical concepts, learned their industry applications using Python and TensorFlow, and tackled real-world cases such as speech recognition, music synthesis, chatbots, machine translation, natural language processing, and more. You are now familiar with the capabilities and challenges of deep learning. You are ready to take the definitive step in the world of AI and participate in the development of leading-edge technology.

A handwritten signature of the name "Andrew Ng".

Andrew Ng,  
Founder,  
DeepLearning.AI

The online specialization named in this certificate may draw on material from courses taught on-campus, but the included courses are not equivalent to on-campus courses. Participation in this online specialization does not constitute enrollment at this university. This certificate does not confer a University grade, course credit or degree, and it does not verify the identity of the learner.

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