

## Deep Learning Overview

- CSCE 633 Machine Learning
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1

## What Is Deep Learning?

- Learning higher level abstractions from data.
- Motivation: how the brain represents sensory information in a hierarchical manner.

2

## The Rise of Deep Learning

Made popular in recent years

- Geoffrey Hinton et al. (2006).
- Andrew Ng & Jeff Dean (Google Brain team, 2012).
- Schmidhuber et al.'s deep neural networks (won many competitions and in some cases showed super human performance; 2011–).

3

## Long History (in Hind Sight)

- Fukushima's Neocognitron (1980).
- LeCun et al.'s Convolutional neural networks (1989).
- Schmidhuber's work on stacked recurrent neural networks (1993).  
Vanishing gradient problem.

4

## Current Trends

- Deep belief networks
- Deep neural networks
- Convolutional neural networks