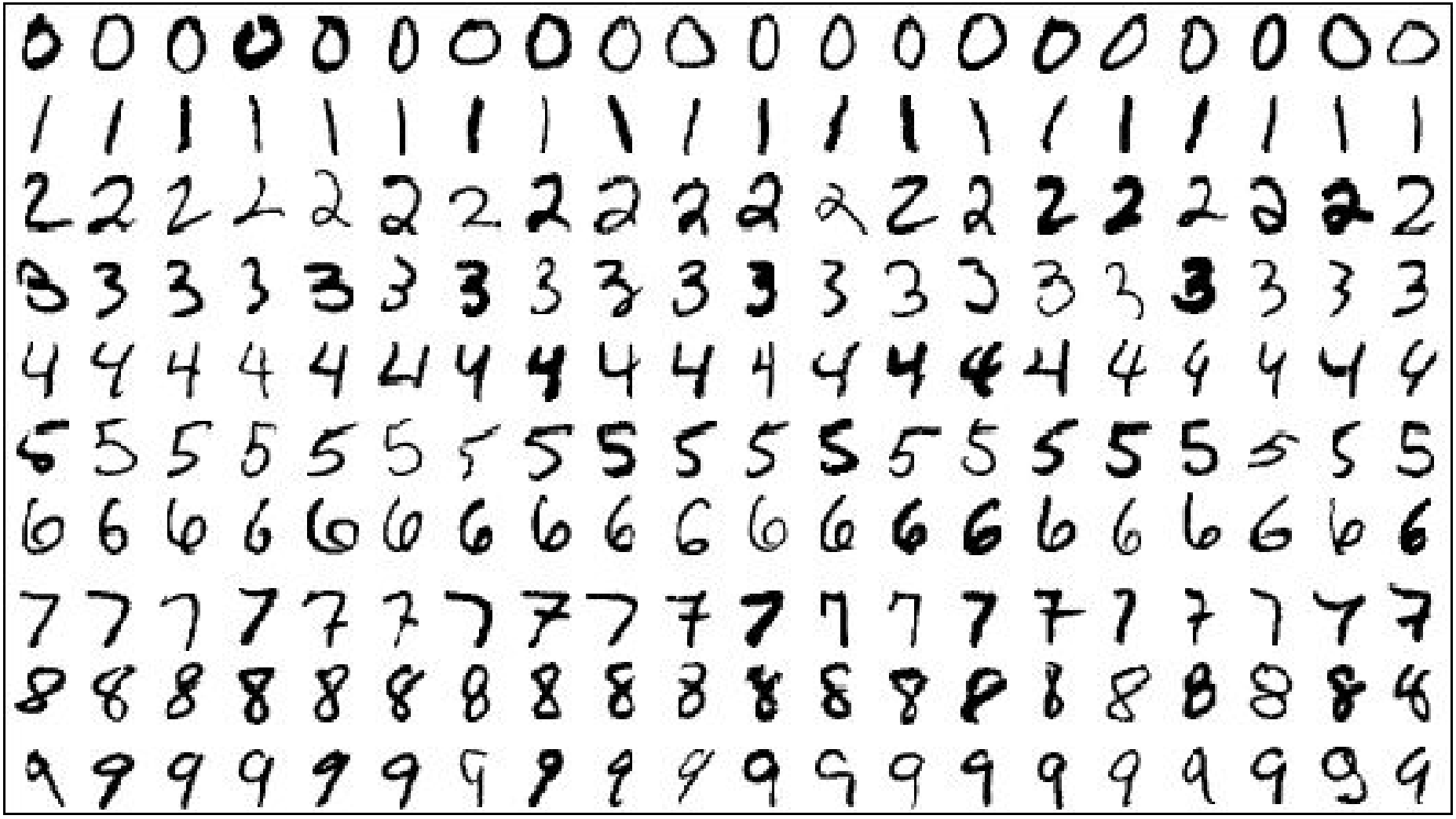
Keras Demo

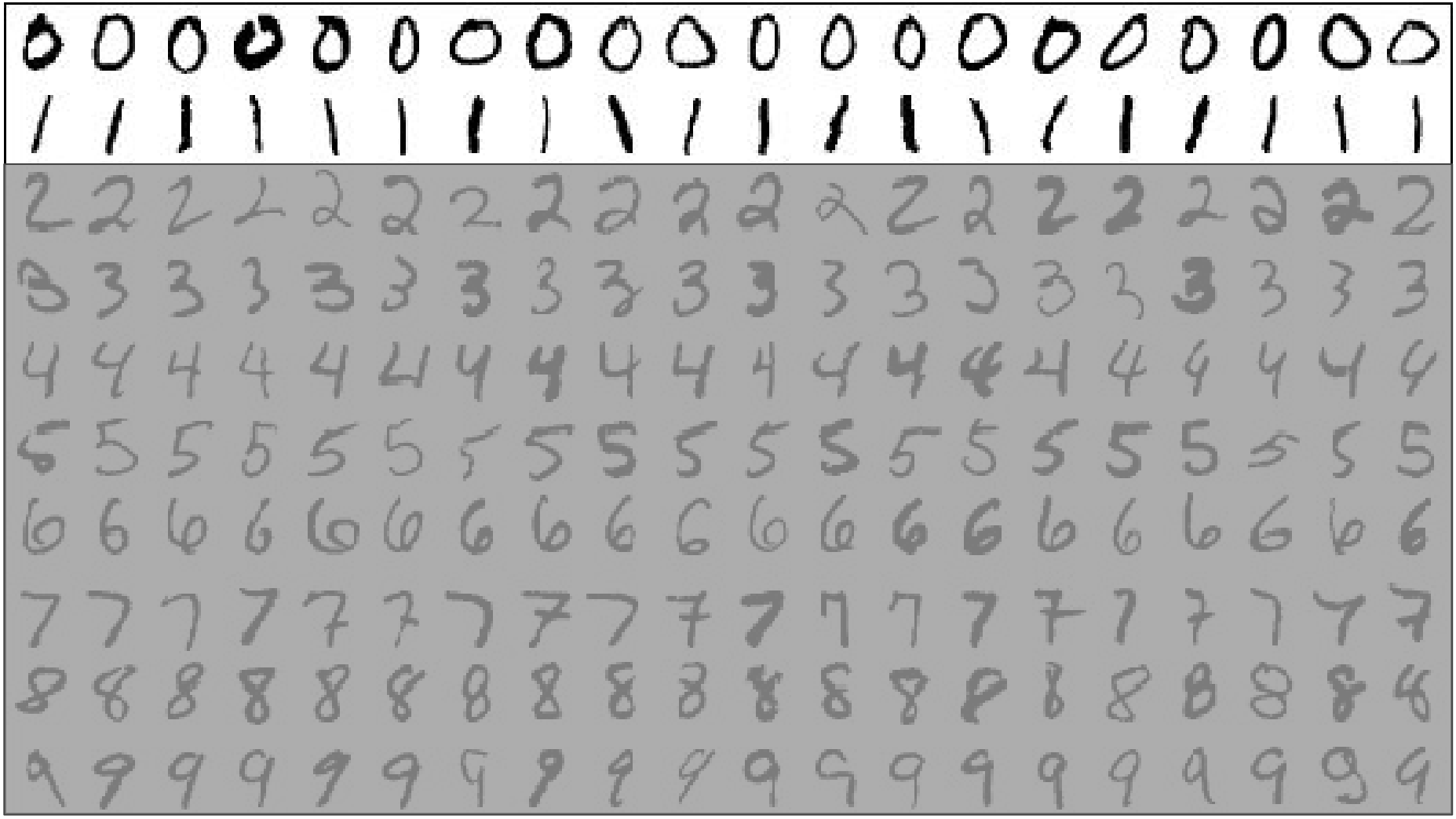
What is Keras?

Keras

- Python library for deep learning
- TensorFlow

MNIST





Multi-class classification

"One v. All" Classification

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Training: 10 binary classifier

"0" or "not 0" classifier

"1" or "not 1" classifier , etc

"One v. All" Classification

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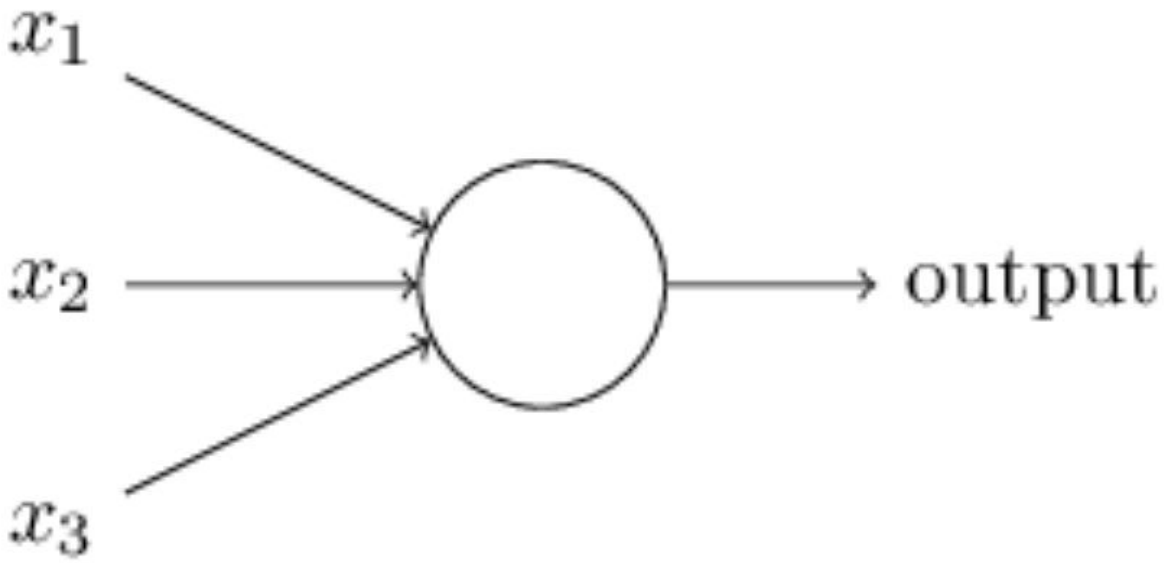
Testing: each classifier votes

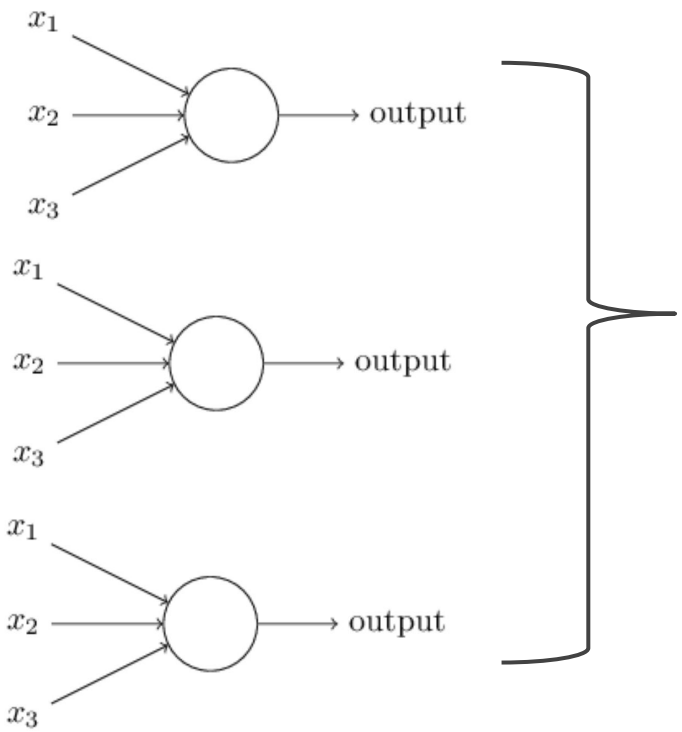
"0" or "not 0" classifier ----> votes NO!

"1" or "not 1" classifier ----> votes **YES!**

Binary Classifier



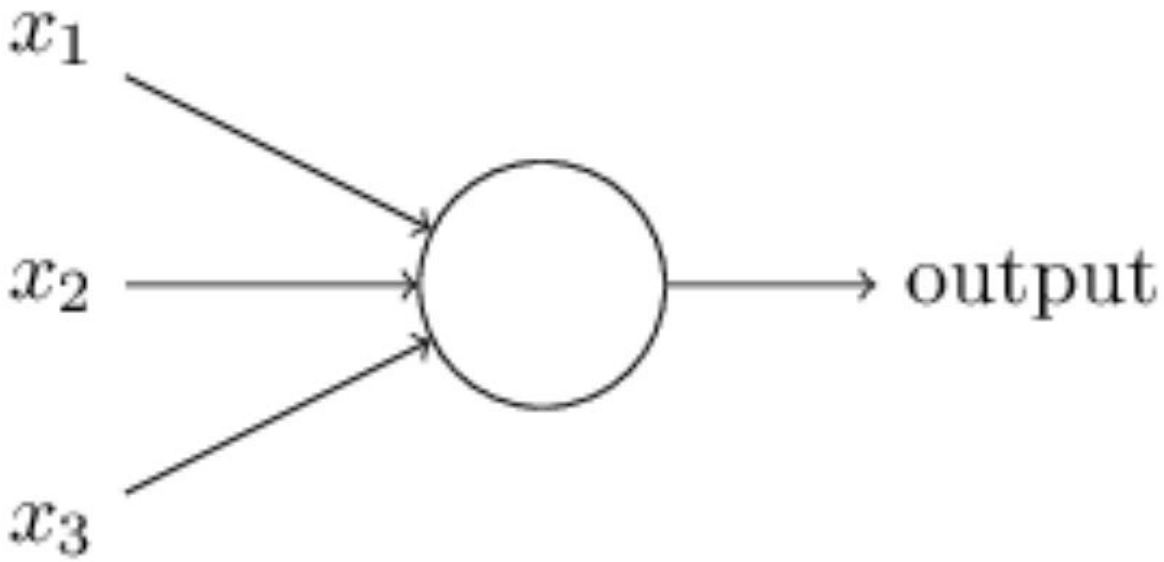
Many Classifiers



vote at test-time:
"soft-max"

Neural Networks

Neural Networks



Activation Function

"Sign Activation Function"

$$y_i \, \mathbf{w}^T \mathbf{x}_i \leq 1$$ <==> sign($y_i w^T x_i$)

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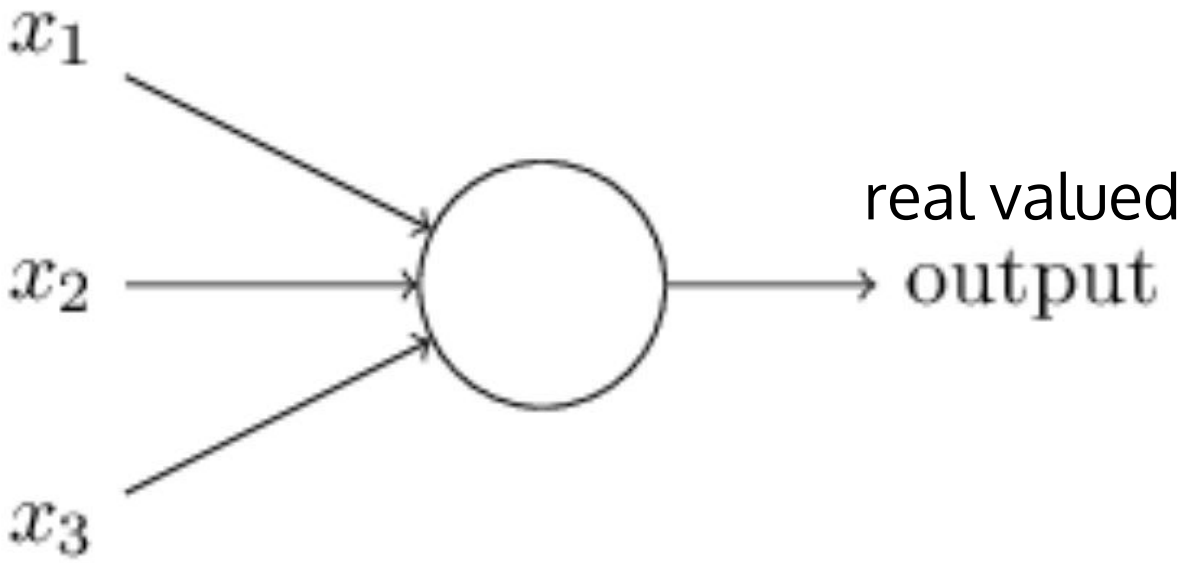
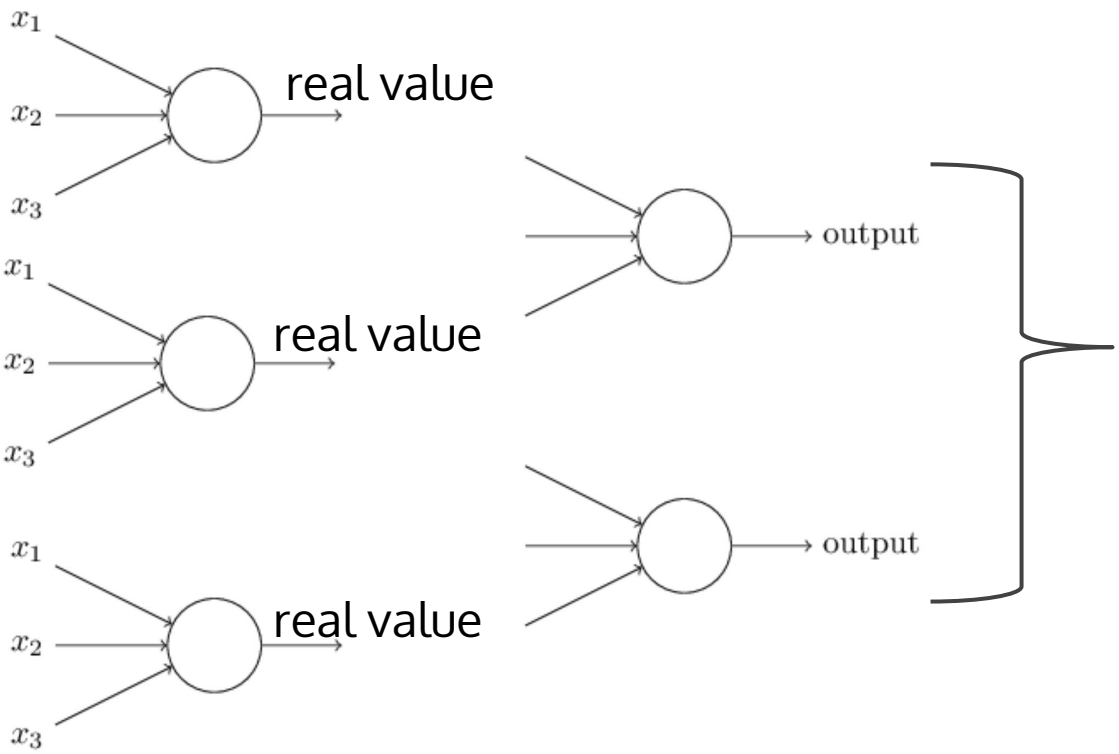
"Relu Activation Function"

max(0, $y_i w^T x_i$)

Neural Networks



Many Classifiers



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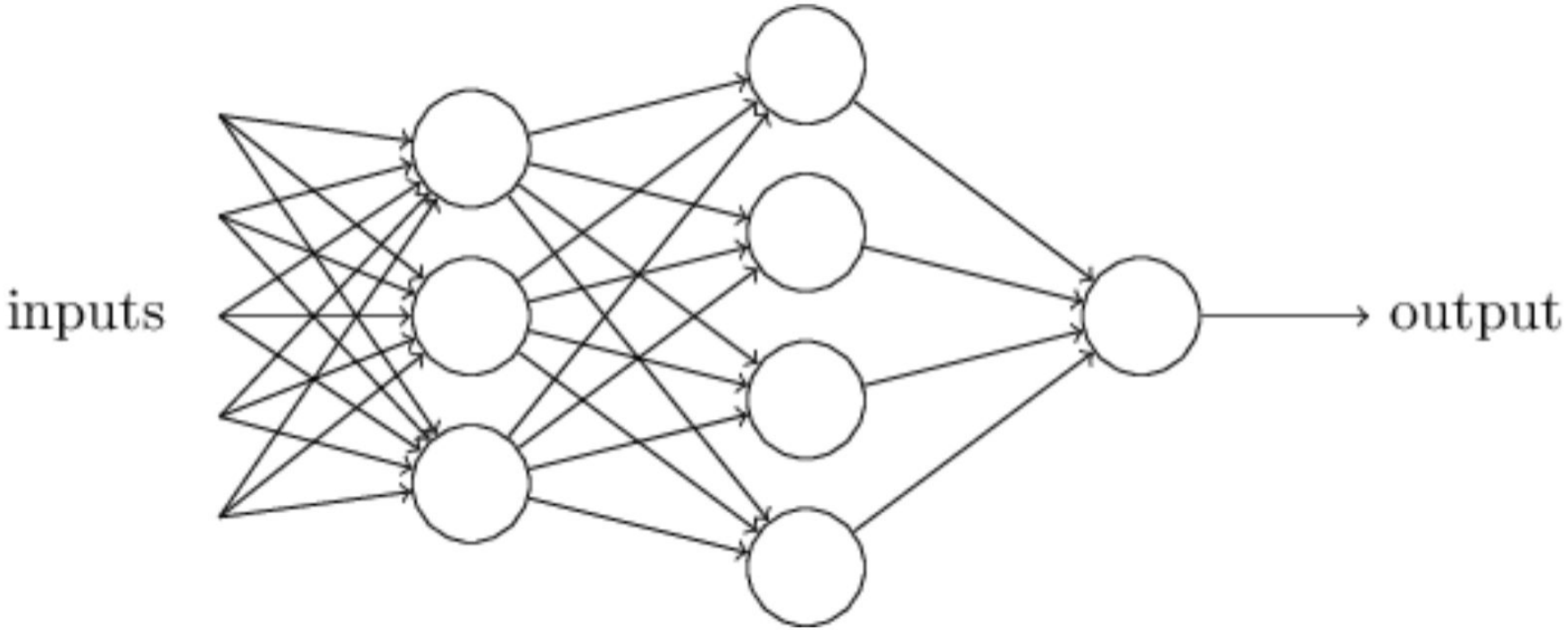
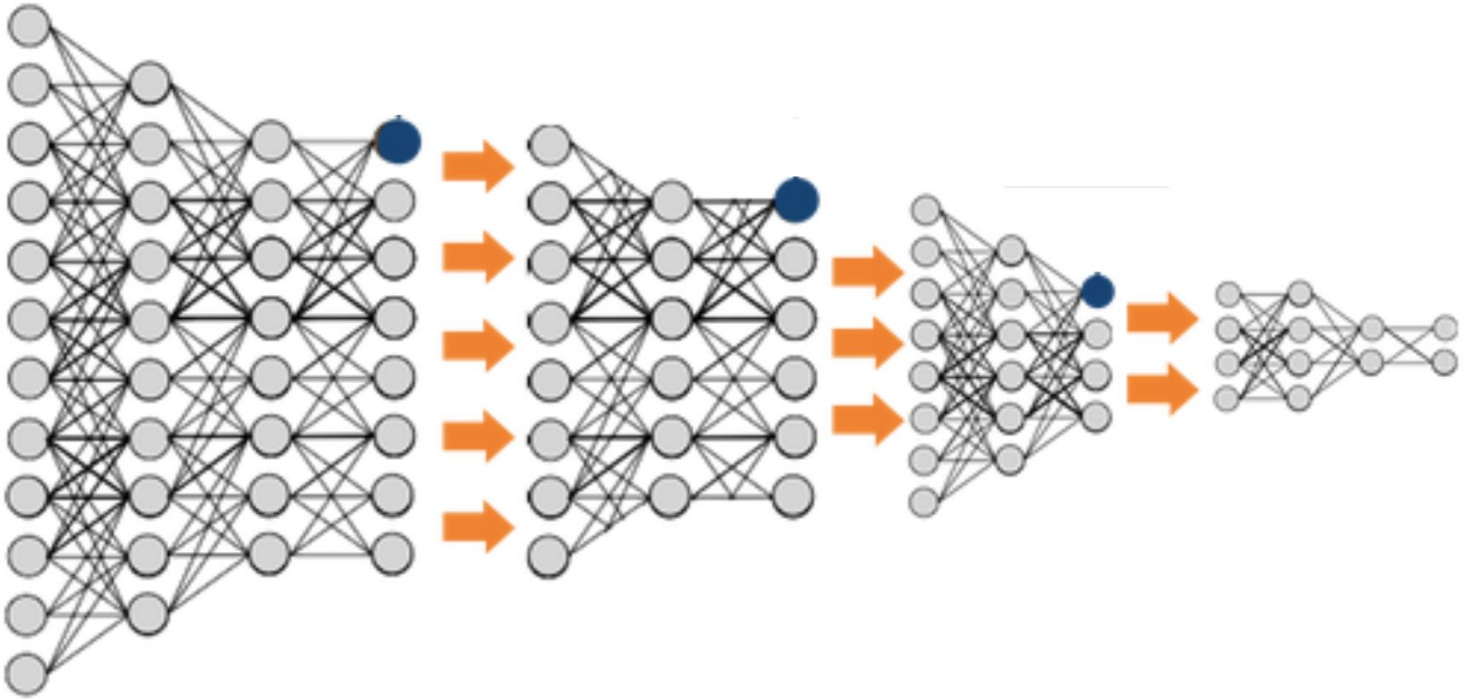
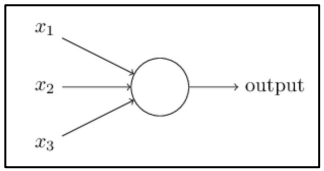
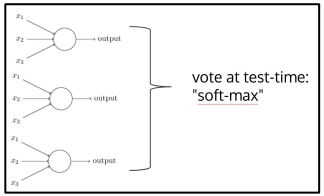
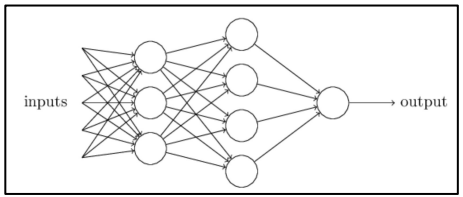

inputs
output

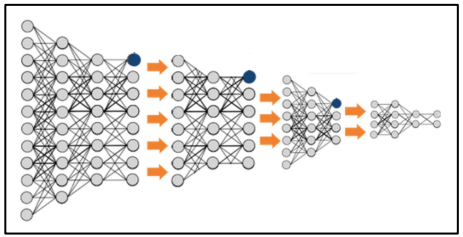
Deep Learning: "Deep" Neural Networks











Demo Outline

1. Binary classification
2. Multiclass classification
3. A simple NN
4. A deeper NN
5. Fancy NN's that get much better accuracy