Deep Learning

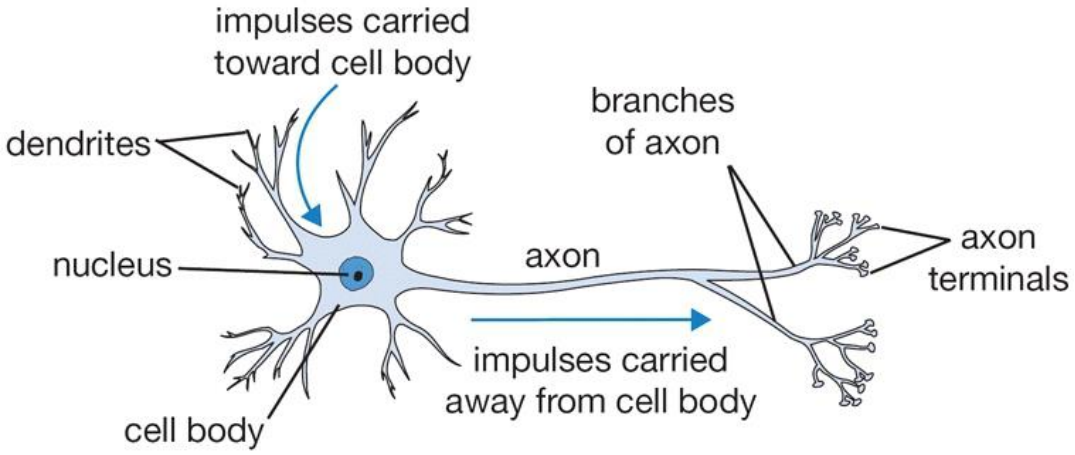
WEEK 8

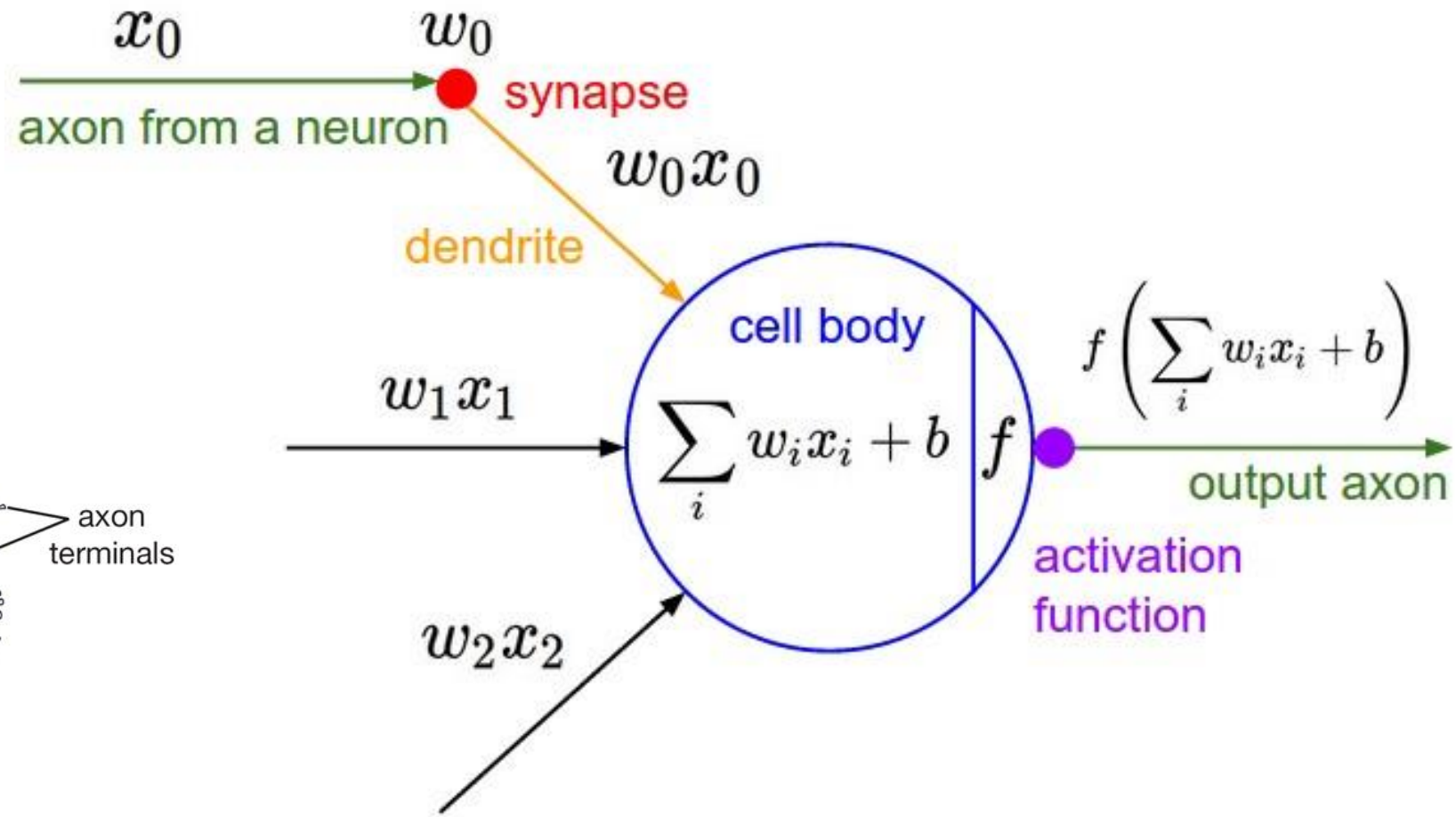
Outline

Neural network introduction

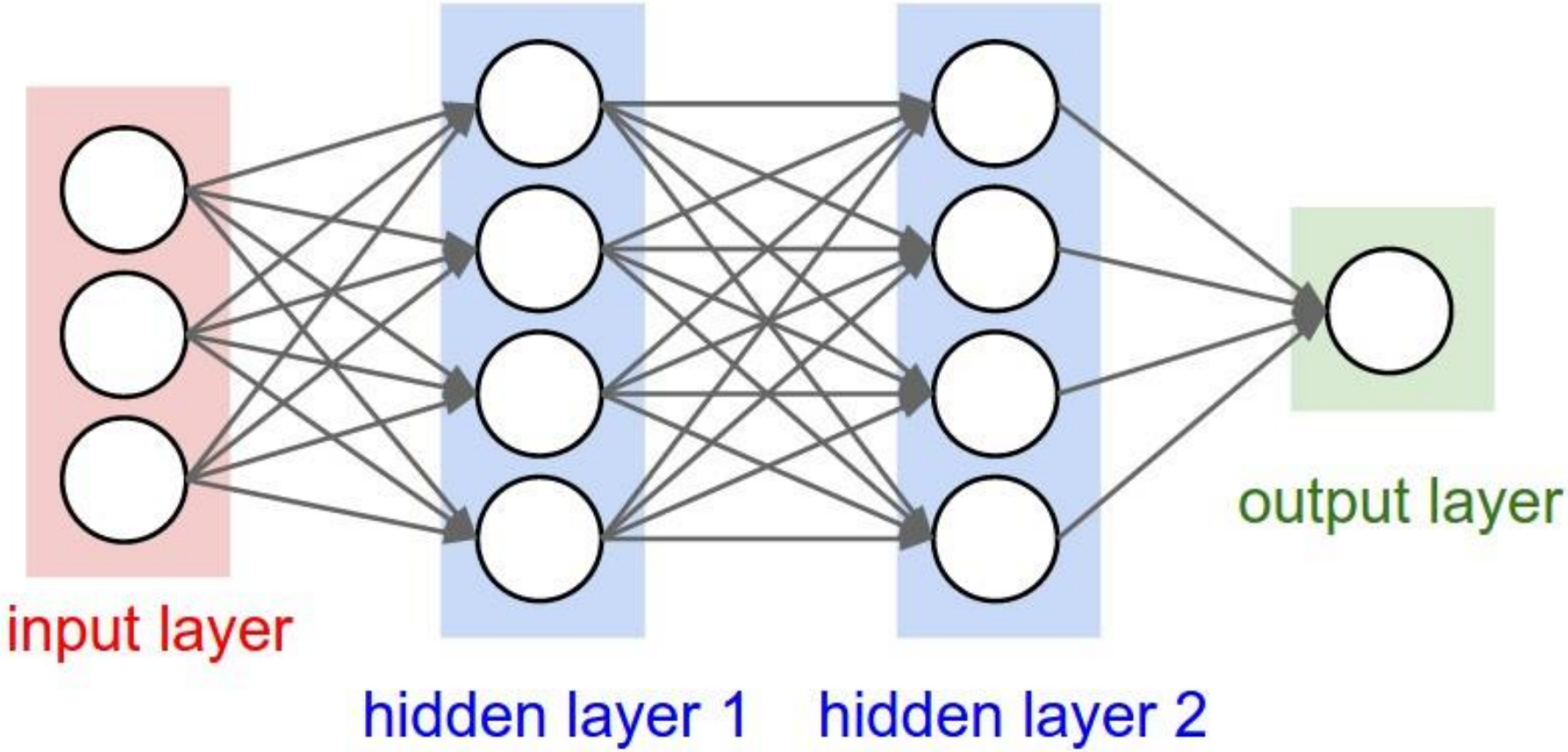
Typical deep learning architecture

Neurons & mathematic abstraction





Deep neural network

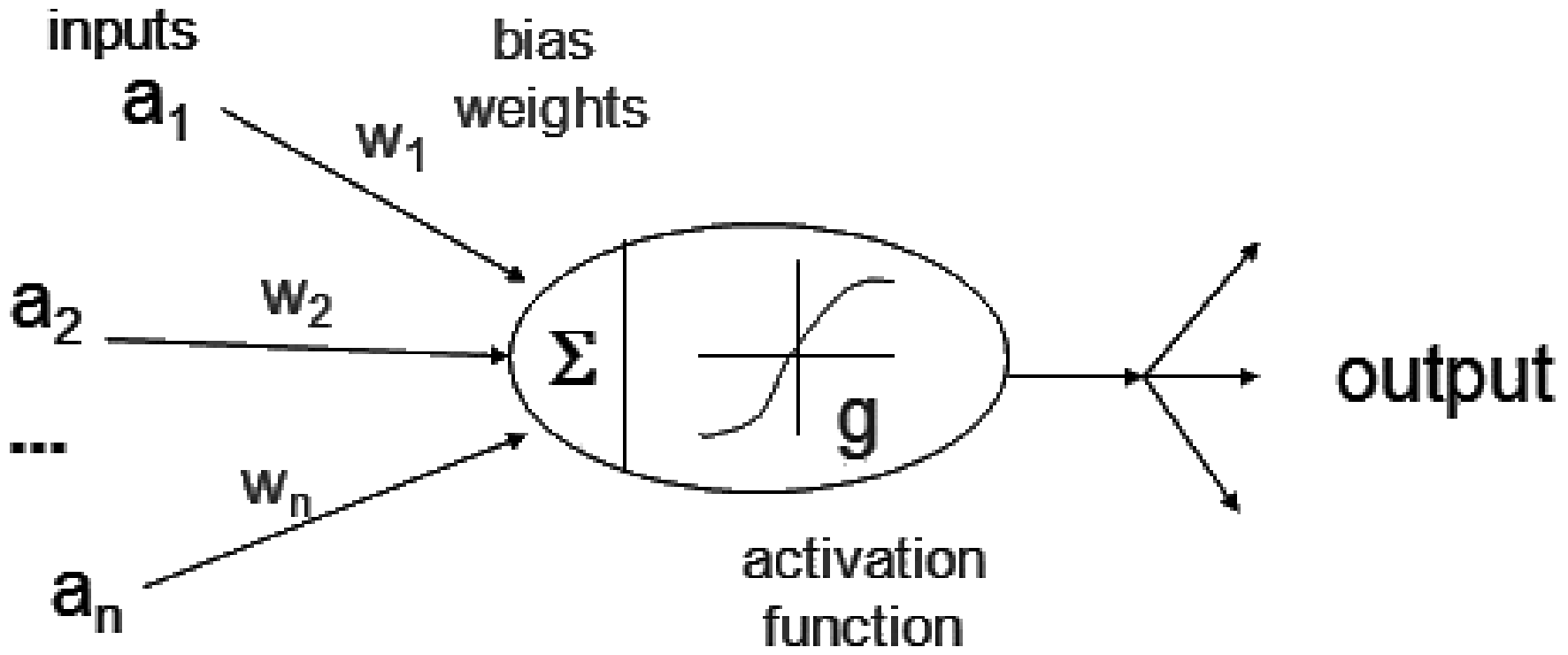


Key concepts

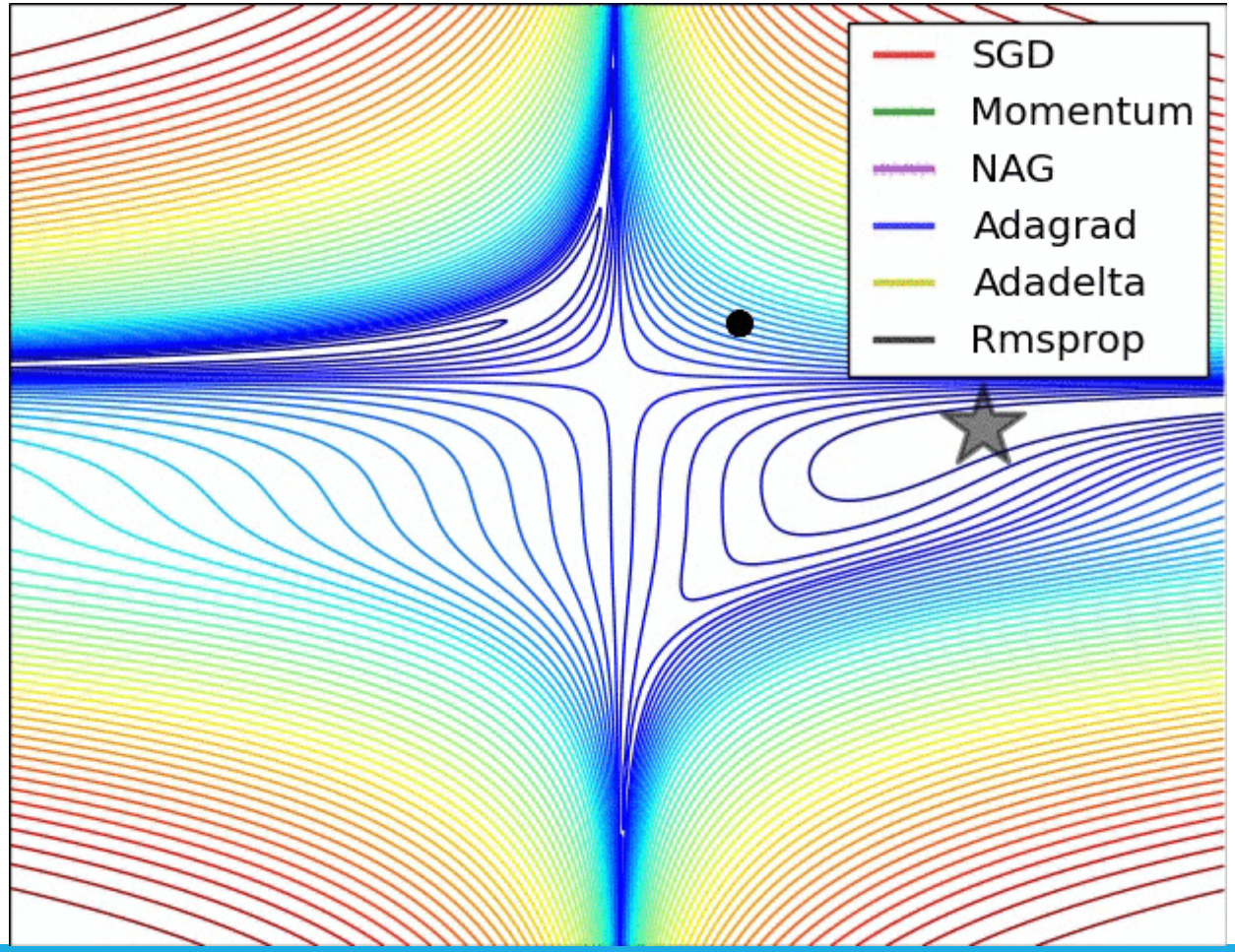
Components

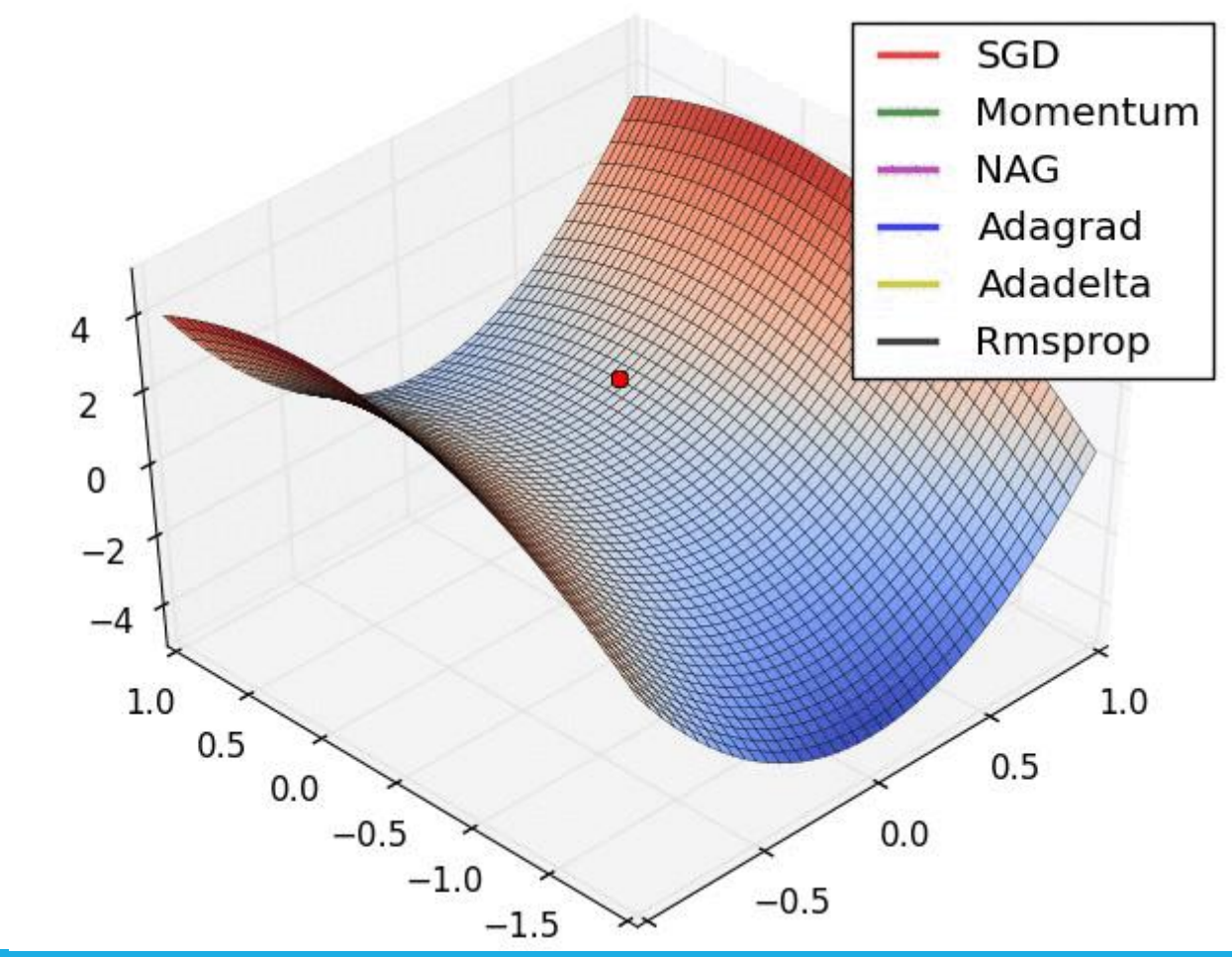
- Objectives
- Layers
- Activation
- Optimizer
- Regularization
- Callback

Activation

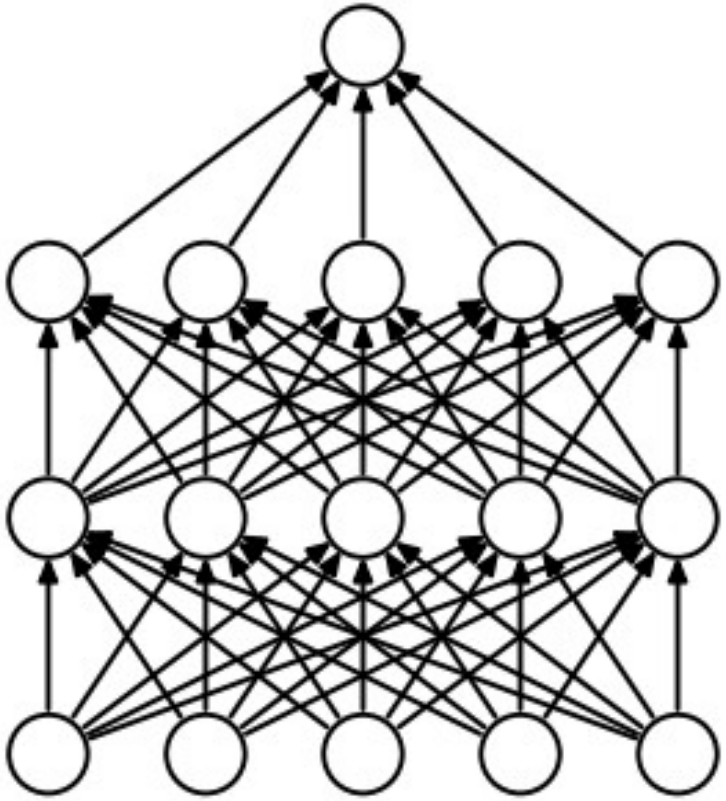

inputs
a_1
bias
weights
w_1
a_2
w_2
...
w_n
a_n
Σ
g
output
activation
function

Optimizers

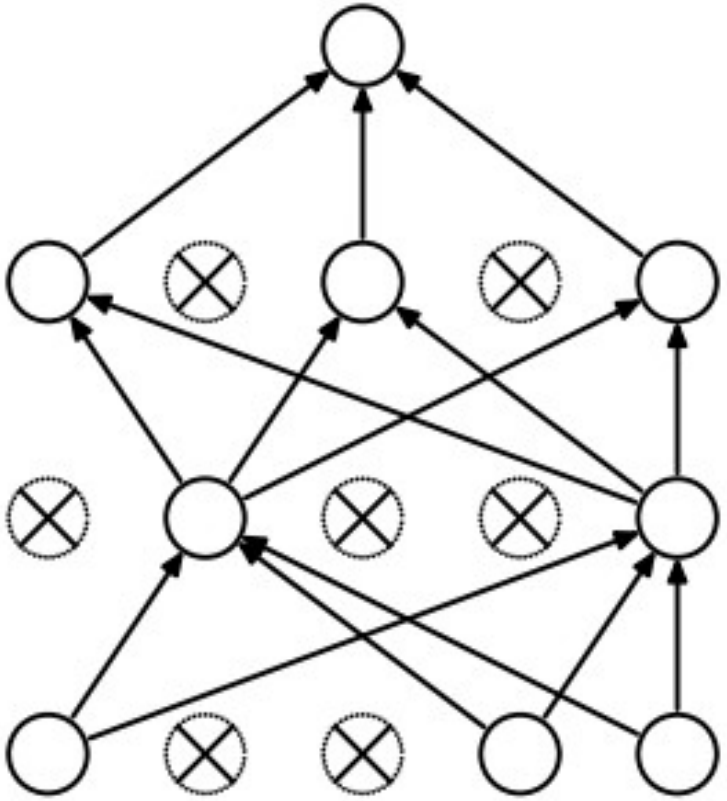

SGD
Momentum
NAG
Adagrad
Adadelta
Rmsprop


SGD
Momentum
NAG
Adagrad
Adadelta
Rmsprop
4
2
0
−2
−4
1.0
0.5
0.0
−0.5
−1.0
−1.5
1.0
0.5
0.0
−0.5

Dropout

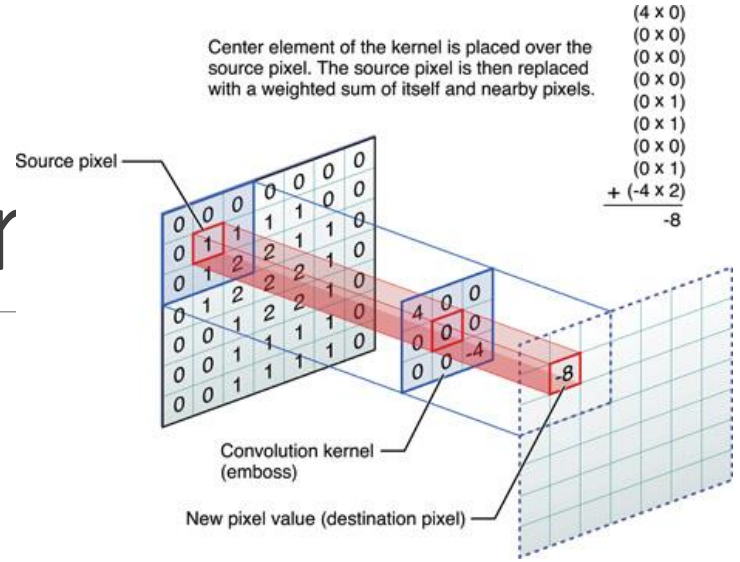


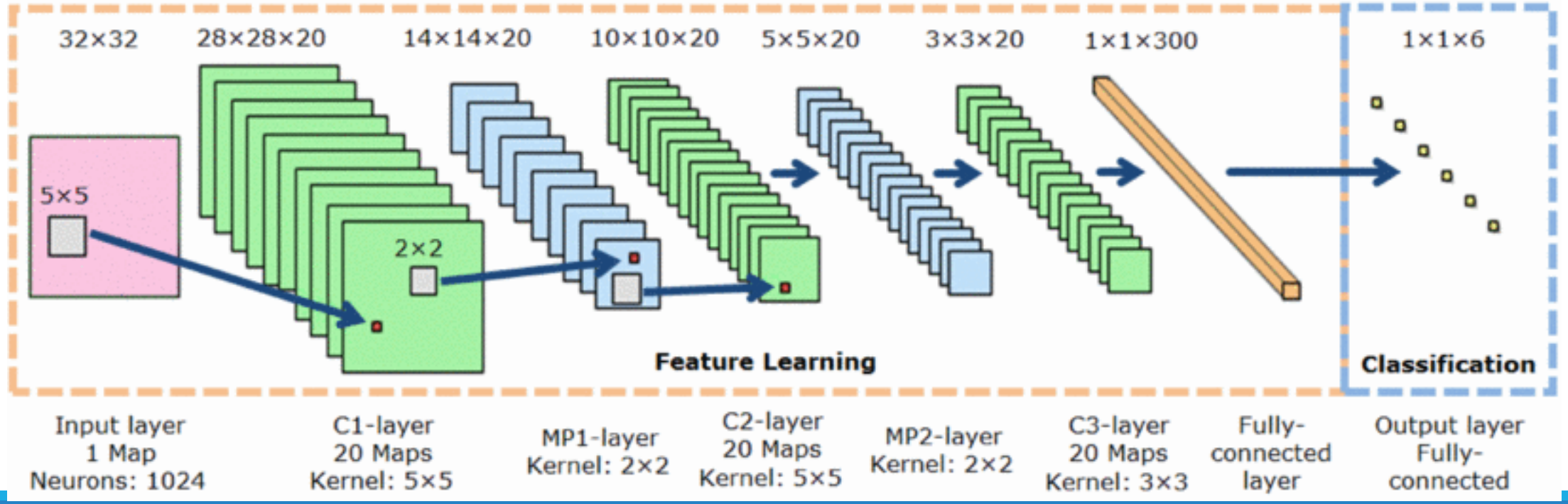
(a) Standard Neural Net



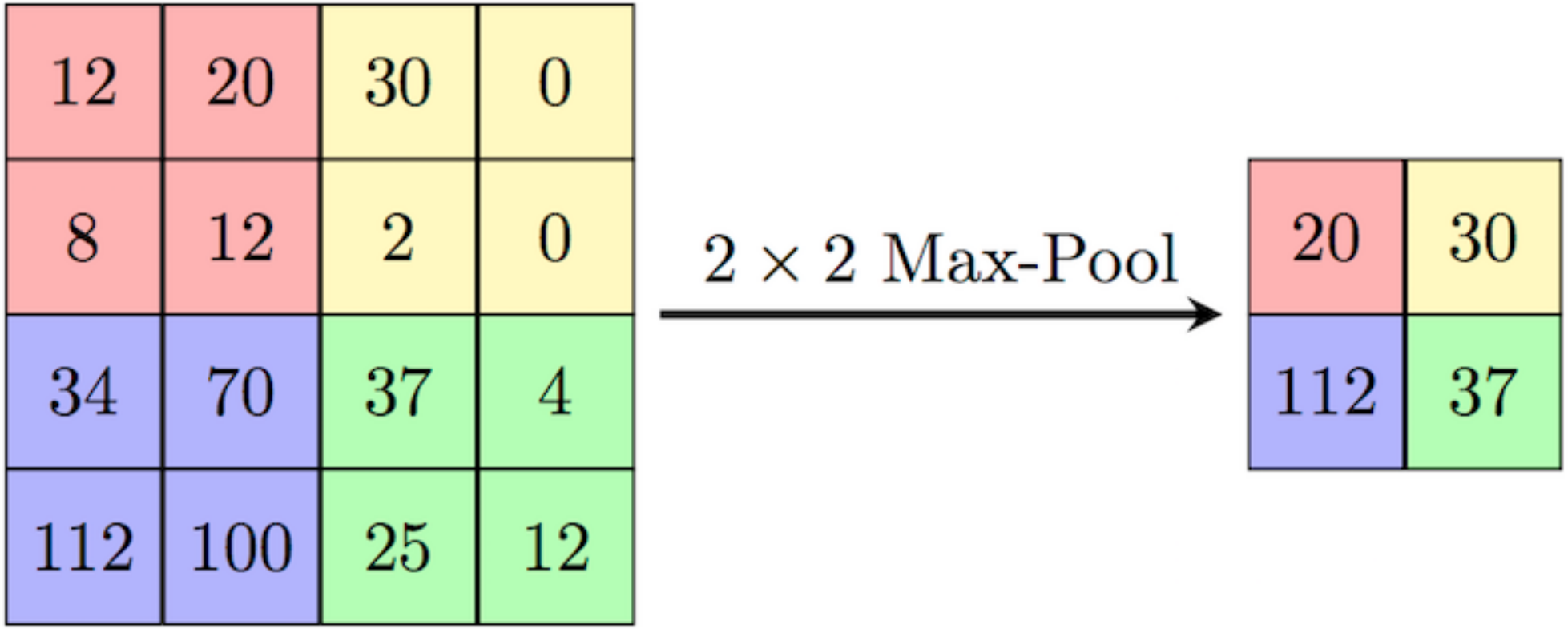
(b) After applying dropout.

Convolutional neural networ





Pooling



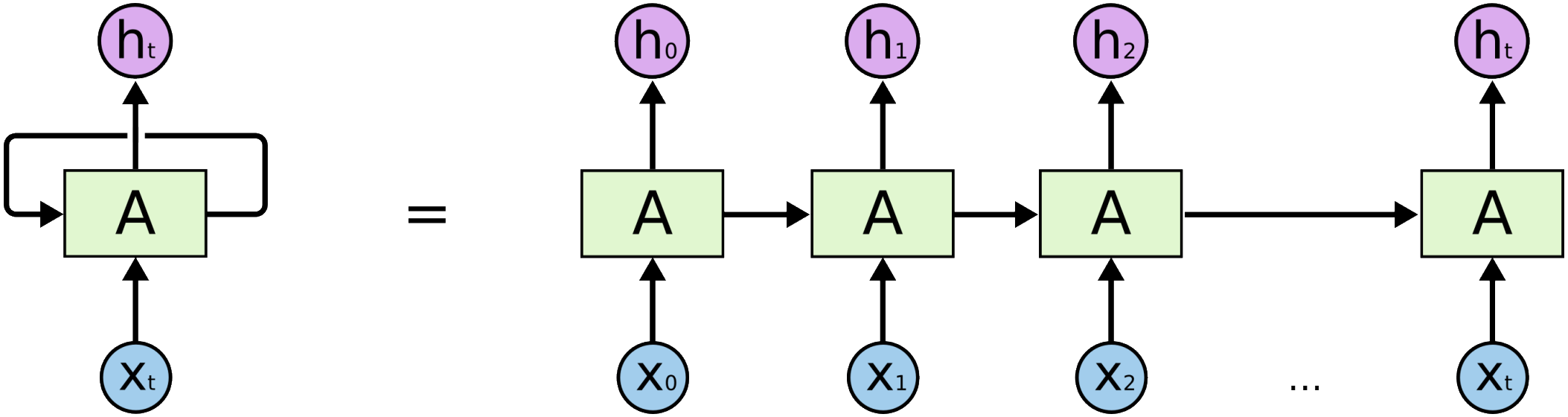
How many parameters needed?

200X200 pixel image? If using full connected network, 1 layer

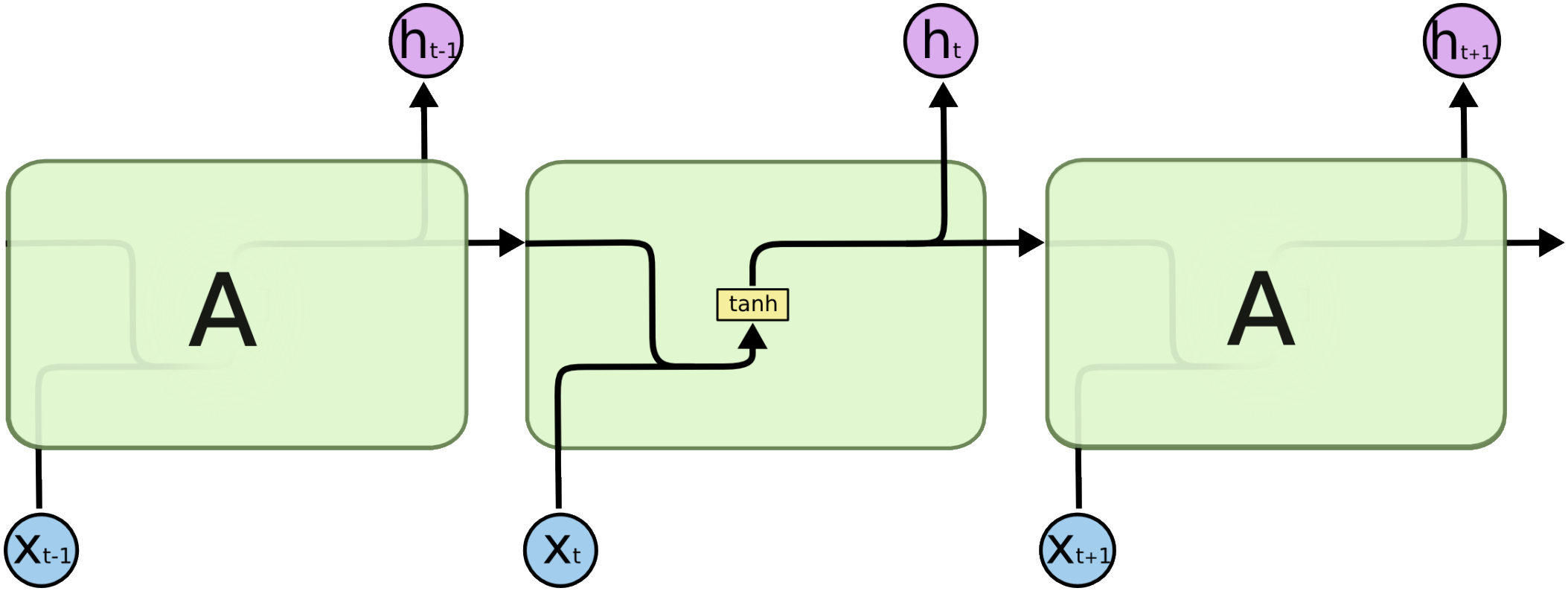
200X200 pixel image? If using full connected network, 2 layer, hidden layer with 10 units?

Conv Net: 10 features (size=5) for 3 conv layers + FC (10 unit)?

Recurrent neural network



Standard RNN



LSTM (Long-Short-Term-Memory)