Deep models used in games

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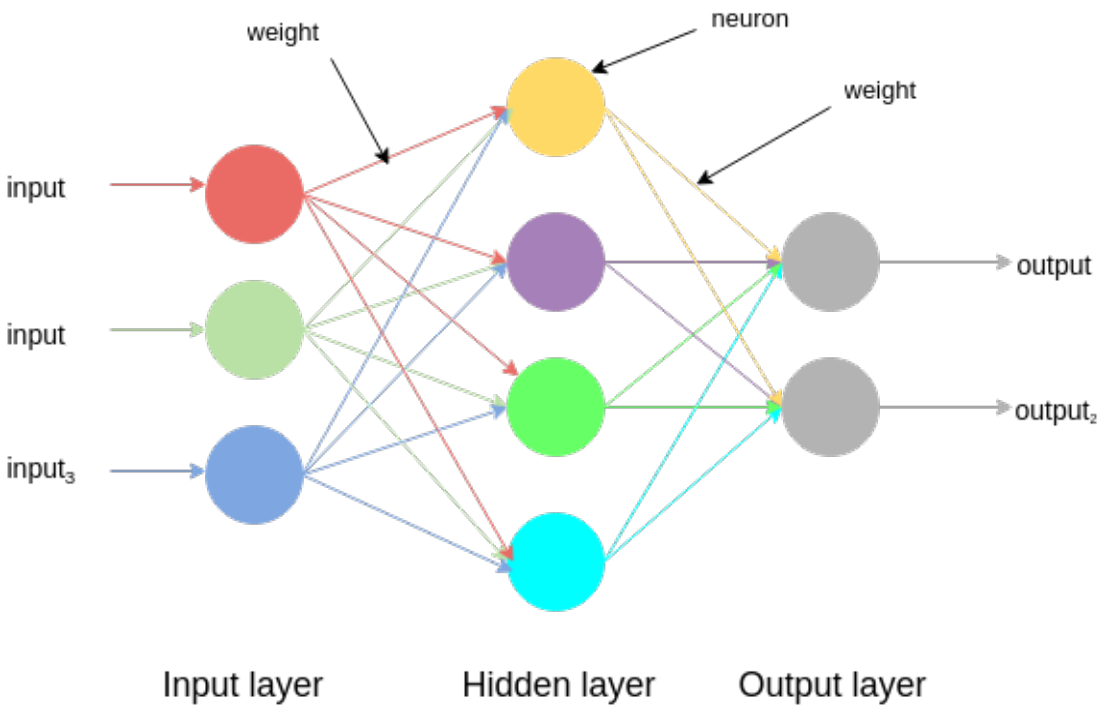
Motivation

- de
- find models capable of generalization

Once upon a time...

- reinforcement learning: Q-Learning
- neural networks **vs** deep neural networks

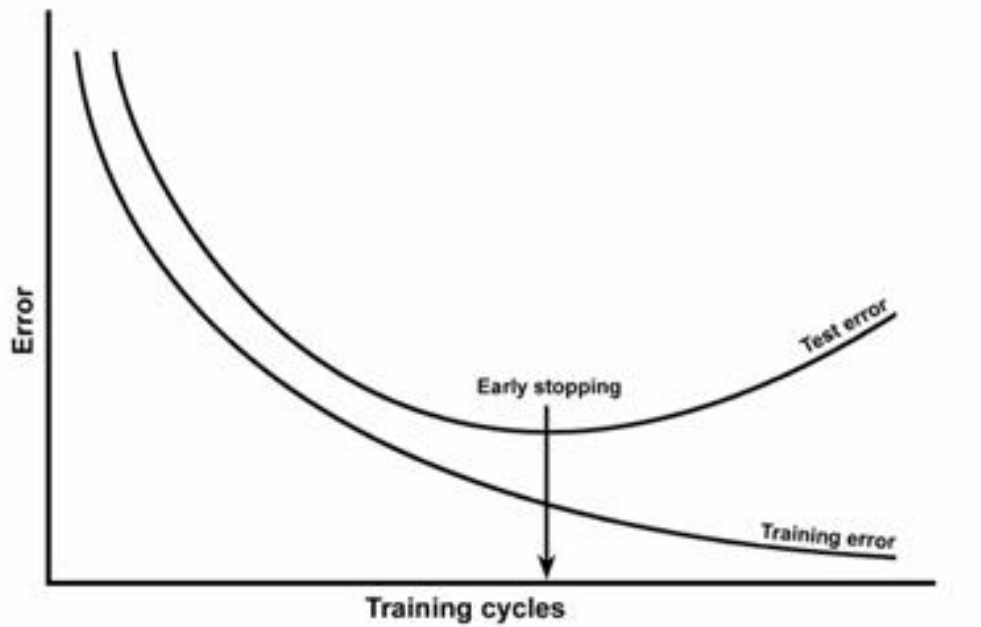


PREPROCESSING, MODEL, LOSS FUNCTION

- color space: RGB, YUV, grayscale
- data normalization 0..1, contrast normalization
- activation functions
  - hidden layer vs output layer
  - tanh, sigmoid, ReLU
- how many layers/features, what type of layers
- loss function: classification(binary/multi-class) or regression?

Train and test

- split dataset for training and testing
- when to stop training?



Once upon a time...

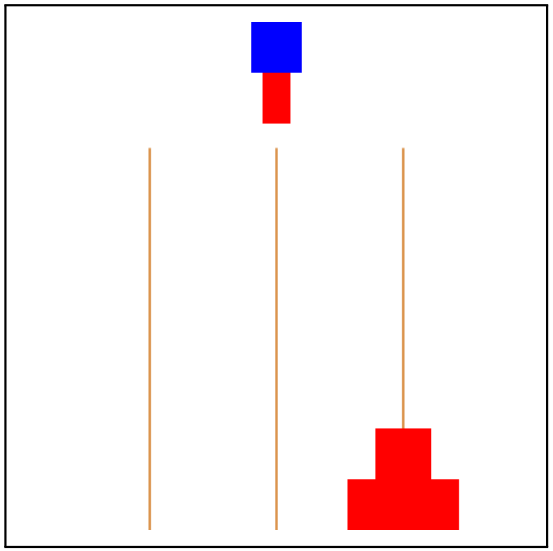
- Basic formula

```
#define MAX(a, b) ((a) > (b) ?  (a) :  (b))
```

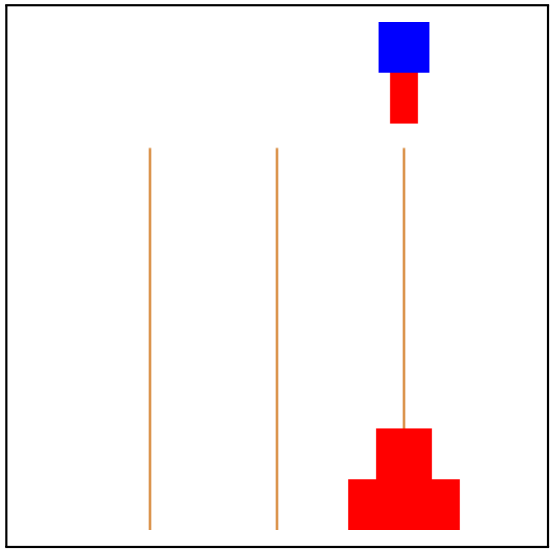
- TODO

Q-Learning

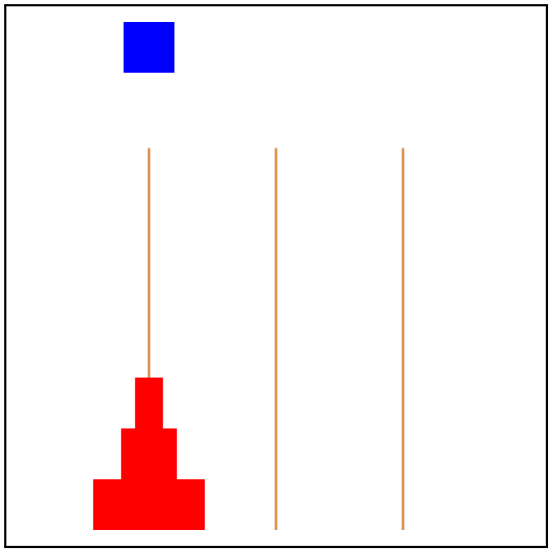
- finds optimal policy for action-value function
- $Q(s,a) = Q(s,a) + \alpha \cdot (r + \gamma \cdot \max_a Q(s', a') - Q(s, a))$



UP = 90,6534
DOWN = 86,8787
LEFT = 89,1867
RIGHT = 94,2824



UP = 97,6530
DOWN = 100,0000
LEFT = 93,8538
RIGHT = 92,5261



UP = 26,3520
DOWN = 23,8452
LEFT = 23,8897
RIGHT = 22,8827

Future work

- implement Q-Network
- test algorithm on dynamic environments or games where the state of the universe is not fully observed
- make Nao capable of playing Tic-Tac-Toe
- after all tasks mentioned above are done, use all the information gathered for cancer classification, etc.

Conclusions

Source:
http://xkcd.com/

Questions

Thank you for your attention!

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