Neural Networks and Deep Learning

Week 1: Introduction to Deep Learning

1 Version 1: Which of the following are some aspects in which AI has transformed business?

Answer: Web searching and advertisement.

Comment: AI has helped to make a fit between services or results and consumers or queries.

1 Version 2: What does the analogy "AI is the new electricity" refer to?

Answer: Similar to electricity starting about 100 years ago, AI is transforming multiple industries.

Comment: AI is transforming many fields from the car industry to agriculture to supply chain.

2 Which of these are reasons for Deep Learning recently taking off? (Check the three options that apply)

Answer: Deep learning has resulted in significant improvements in important applications such as online advertising, speech recognition, and image recognition; We have access to a lot more data; We have access to a lot more computational power.

Comment: See examples discussed in lecture 3; The digitalization of our society has played a huge role in this; The development of hardware, perhaps especially GPU computing, has significantly improved deep learning algorithms.

3. Version 1: Recall the diagram of iterating over different ML ideas. Which of the stages shown in the diagram was improved with the use of a better GPU/CPU?

Answer: Some algorithms are specifically designed to run experiments faster; Experiments finish faster, producing better ideas through increased iteration tempo.

Comment: Some algorithms look specifically to improve the time needed to run an experiment and thus enable use to produce better models; The experiments help to test ideas, by getting the feedback from the experiments new variations can be tested and the results might indicate new directions to explore.

3 Version 2: Recall this diagram of iterating over different ML ideas. Which of the statements below are true? (Check all that apply)

Answer: Being able to try out ideas quickly allows deep learning engineers to iterate more quickly; Faster computation can help speed up how long a team takes to iterate to a good idea; Recent progress in deep learning algorithms has allowed us to train good models faster (even without changing the CPU/GPU hardware).

Comment: See Lecture 4; For example we discussed how switching from sigmoid to ReLU activation functions allows faster training.

4 Version 1: Neural networks are good at figuring out functions relating an input x to an output y given enough examples. True/False?

Answer: True.

Comment: With neural networks, we don't neet to design features by ourselves. The neural network figures out the necessary relations given enough data.

4 Version 2: When an experienced deep learning engineer works on a new problem, they can usually use insight from previous problems to train a good model on the first try, without needing to iterate multiple times through different models. True/False?

Answer: False.

Comment: Finding the characteristics of a model is key to have good performance. Although experience can help, it requires multiple iterations to build a good model.

5 ReLU stands for which of the following?

Answer: Rectified Linear Unit

Comment: You may also want to take a look at the plot of ReLU which was mentioned in the lecture.

6 Images for cat recognition is an example of "structured" data, because it is represented as a structured array in a computer. True/False?

Answer: False.

Comment: This is an example of unstructured data.

7 Version 1: A dataset is composed of age and weight data for several people. This dataset is an example of structured data because it is represented as an array in computer. True/False?

Answer: True.

Comment: See lecture.

7 Version 2: A demographic dataset with statistics on different cities' population GDP per capita, economic growth is an example of unstructured data because it contains data coming from different sources. True/False?

Answer: False.

Comment: This is an example of structured data.

8 Version 1: RNNs (Recurrent Neural Networks) are good for data with a temporal component. True/False?

Answer: True.

Comment: RNN are designed to work with sequences; the elements of a sequence can bve sorted by a temporal component.

8 Version 2: Why is RNN (Recurrent Neural Networks) used for machine translation, say translating English to French? (Check all that apply)

Answer: It can be trained as supervised learning problem; It is applicable when the input/output is a sequence (e.g. a sequence of words)

Comment: We can train it on many pairs of sentences X (English) and y (French); An RNN can map from a sequence of English words to a sequence of french words.

9 In this diagram which we hand-drew in the lecture, what do the horizontal axis (x-axis) and vertical axis (y-axis) represent?

Answer: x-axis is the amount of data, y-axis (vertical axis) is the performance of the algorithm.

10 Version 1: Assuming the trends described in the figure are accurate. Which of the following statements are true? Choose all that apply.

Answer: Increasing the training set size of a traditional learning algorithm stops helping to improve the performance after a certain size; Increasing the size of a neural network generally does not hurt an algorithm's performance, and it may help significantly.

Comment: After a certain size, traditional learning algorithms don't improve their performance; According to the trends in the figure above, big networks usually perform better than small networks.

10 Version 2: Assuming the trends described in the previous question's figure are accurate (and hoping you got the axis labels right), which of the following are true? (Check all that apply)

Answer: Increasing the size of a neural network generally does not hurt an algorithm's performance, and it may help significantly; Increasing the training set size generally does not hurt an algorithm's performance, and it may help significantly.

Comment: Bringing more data to a model is almost always beneficial.