DARSHAN PATEL

FORDHAM UNIVERSITY GABELLI SCHOOL OF BUSINESS

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Assignment 2

ExeCUTIVE SUMMARIES FOR Intel AI Academy exercises

Classifying Images

1. Research Question

In this study, a set of images is given where each image needs to be grouped into whether it shows an airplane, automobile, bird, cat, deer, dog, frog, horse, ship or truck.

1. Method

To classify the images, a convolutional network is made. The network will use two layers to reduce the dimensions of the output. The output is flattened and then becomes a single fully connected layer which is then passed to a final classification layer.

1. Results and Discussion

With each run of the image dataset, the neural network performed from 48% to 62% accuracy on the training data, making improvements in accuracy, as seen in Figure 1. On the real unseen data, the model increases in accuracy up to the 9th iteration where afterwards the accuracy decreases. It can be concluded that with 9 epochs, or run throughs of the dataset, the model performed with best accuracy.

1. Conclusion and Implications

In this study, a simple convolutional network was used to classify images into ten different objects. It was found that multiple run throughs of the data did not help to better classify the data, with the model only learning little to nothing. The model with 9 epochs will provide 60% accuracy in classifying image data into 10 objects in the real world.



Figure 1

Finding Patterns of Words

1. Research Question

In this study, the text “Alice in Wonderland” is used to find patterns amongst words in a sentence. The goal is to find most probable words before and after certain words.

1. Method

Using a neural network, an entire document is split into sentences and tokenized which is then fed into a shallow skipgram model. The model detects common words around each specific word in the document. The model is compiled and then fitted on words to find how inaccurate the classification is on new parts of the document.

1. Results and Discussion

It was found that as the model was trained more and more on new batches of words, patterns in what appears near each work became more profound. As seen in Figure 2, crossentropy loss decreases almost linearly as each iteration of the model fitting goes by.

1. Conclusion and Implications

Finding patterns in strings of words is a challenging task; from the English language, countless words can appear before and after specific words. Using a neural network was one technique to accomplish this task. For a test trial, it was found that the word “king” has a 94% percent in being in the same sentence as the word “queen.” A list of common words related to “queen” included “duchess,” “gryphon,” “king,” and “dormouse.” The model appears to find words that do have similarity in each other and would belong in a sentence together. This model can be used to find similar words for many fantasy and royalty-type terms since it was built on “Alice in Wonderland.”



Figure 2

Classifying Reviews from IMDB

1. Research Question

In this study, a collection of reviews are taken from the IMDB dataset to perform sentiment analysis. The goal is to classify these sequences into one of two types of sentiments.

1. Method

A recurrent neural network will be made with an embedding layer to train words to detect patterns. Using two more layers, the network becomes a recurrent one where the output of each iteration is used for the next one. The model is fitted to perform ten run throughs of the data to maximize accuracy in the sentiments.

1. Results and Discussion

It is found that after training the neural network, sentiments are properly classified with 84% accuracy on the data it was trained on, as seen in Figure 3. This is a jump from the 77% accuracy after the model was fitted from one iteration. Increasing iterations can help to maximize how the model understands sentiments. Furthermore, it was found that sentiments are properly classified 79% of the time on data the model has never seen.

1. Conclusion and Implications

A recurrent neural network was used to classify sentiments from thousands of IMDB data values. It was found that it has a rate of ~80% of accuracy to properly classify sentiments. This model can be used in the real world to understand how films are received by the audience. Using the model, audience reactions to films can be predicted with decent accuracy. It can help to understand how people react to different films so that proper marketing strategies can be used to maximize audience’s enjoyment of films.



Figure 3

Classifying News Topics

1. Research Question

In this study, a collection of newsgroups posts are given. The goal is to use the content in the post to group the post into a distinct category.

1. Method

An artificial recurrent neural network, or LSTM network, will be made an intial embedding layer to represent words in numerical form. Using two more layers, the LSTM layer and a dense layer, the network now has an LSTM architecture where values are remembered over time intervals. The model is fitted to perform 20 run throughs of the data to maximize accuracy in the classification.

1. Results and Discussion

It is found that after training the neural network, news categories are properly classified with 55% accuracy on the data it was trained on, as seen in Figure 4. This is a jump from the 30% accuracy after the model was fitted from one iteration. Increasing iterations helps the network learn more and more about the data. However, the rate at which its learning is diminishing. Furthermore, it was found that news categories are properly classified 48% of the time on data the model has never seen after 20 run throughs.

1. Conclusion and Implications

A recurrent neural network with a LSTM framework was used to classify news categories for thousands of newsgroups. It has a rate of ~48% of accuracy on new newsgroups. This model can be used in the real world to classify articles on a news website. It will also help people find categorized news articles to read.



Figure