Lecture 2: Neural Networks for Sentiment Analysis.

1. Neural Networks for Sentiment Analysis

1. What is the main goal of using neural networks in sentiment analysis?

   o A) To count the number of words in a sentence

   o B) To classify text as positive or negative

   o C) To extract keywords from text

   o D) To remove stop words from a document

   o **Answer:** B

2. In a neural network for sentiment analysis, what is the **input** to the model?

   o A) Raw text

   o B) Tokenized words

   o C) Word embeddings

   o D) Sentiment scores

   o **Answer:** C

3. Why is **padding** applied to text input in sentiment analysis models?

   o A) To remove unnecessary words

   o B) To ensure all input sequences have the same length

   o C) To add extra meaning to sentences

   o D) To replace missing values in the dataset

   o **Answer:** B

4. What is the **final layer** in a neural network for binary sentiment classification?

   o A) Softmax

   o B) Sigmoid

   o C) ReLU

   o D) Tanh

   o **Answer:** B

5. In sentiment analysis, what type of labels are used for **binary classification**?

   o A) Continuous values between 0 and 1

   o B) Categories such as "Positive" and "Negative"

   o C) Multiple sentiment scores

   o D) A mix of numerical and categorical labels

   o **Answer:** B

6. Which of the following is **NOT** a challenge in sentiment analysis?

   o A) Understanding sarcasm

   o B) Handling negations

   o C) Counting the number of words in a sentence

   o D) Differentiating between similar words in different contexts

   o **Answer:** C

7. What is the **first step** in preprocessing text for neural network-based sentiment analysis?

   o A) Tokenization

   o B) Applying activation functions

   o C) Generating sentiment scores

   o D) Normalizing sentence length

   o **Answer:** A

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2. Dense and ReLU Layers

8. What is the purpose of a **Dense layer** in a neural network?

   o A) To convert categorical variables into numerical values

   o B) To connect all neurons from one layer to the next

   o C) To perform convolution operations on images

   o D) To remove redundant features from input data

   o **Answer:** B

9. A Dense layer contains:

- A) Only input neurons
- B) Trainable parameters such as weights and biases
- C) A predefined set of output values
- D) Only activation functions
- **Answer:** B

10. What is the role of the **ReLU activation function** in a Dense layer?

- A) It ensures all values remain within a fixed range
- B) It introduces non-linearity by zeroing out negative values
- C) It normalizes the input data
- D) It calculates the probability of each class
- **Answer:** B

11. Which of the following best describes the **ReLU function**?

- A) ReLU(x)=max⬚(0,x)ReLU(x) = \max(0, x)ReLU(x)=max(0,x)
- B) ReLU(x)=ex/(1+ex)ReLU(x) = e^x / (1 + e^x)ReLU(x)=ex/(1+ex)
- C) ReLU(x)=1/(1+e−x)ReLU(x) = 1 / (1 + e^{-x})ReLU(x)=1/(1+e−x)
- D) ReLU(x)=x2ReLU(x) = x^2ReLU(x)=x2
- **Answer:** A

12. What is the main **advantage** of using ReLU over Sigmoid?

- A) It prevents vanishing gradients
- B) It always outputs values between 0 and 1
- C) It can process text inputs directly
- D) It normalizes data before training
- **Answer:** A

13. What problem does ReLU **help mitigate** in deep neural networks?

- A) Vanishing gradient problem

- B) Exploding gradient problem

- C) Underfitting

- D) Overfitting

- **Answer:** A

14. What is a common issue with **ReLU**, leading to neurons being inactive?

- A) Dying ReLU problem

- B) Exploding gradient problem

- C) Overfitting

- D) Vanishing gradient problem

- **Answer:** A

15. What happens when the **Dying ReLU** problem occurs?

- A) Some neurons always output zero, making them inactive

- B) The neural network stops training

- C) The network's accuracy increases

- D) The learning rate becomes unstable

- **Answer:** A

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3. Other Layers

16. What is the purpose of an **Embedding layer** in NLP models?

- A) To convert words into dense vector representations

- B) To remove unnecessary words from text

- C) To increase the number of neurons in a model

- D) To predict the next word in a sentence

- **Answer:** A

17. How is an **Embedding layer** different from one-hot encoding?

- A) It captures word meanings and relationships

- B) It uses binary vectors

- C) It assigns a unique index to each word

- D) It requires more storage than one-hot encoding

- **Answer:** A

18. Which of the following **best describes** the Embedding layer?

- A) It learns vector representations of words

- B) It converts words into one-hot encoded vectors

- C) It removes punctuation from text

- D) It applies dropout to input data

- **Answer:** A

19. What is the purpose of the **Mean layer** in text processing?

- A) It computes the average word embedding for a sentence

- B) It normalizes text before tokenization

- C) It selects the most important words in a sentence

- D) It predicts the next word in a sequence

- **Answer:** A

20. The **Mean layer** has how many trainable parameters?

- A) None

- B) The same as the embedding layer

- C) One per word in the vocabulary

- D) It depends on the dataset size

- **Answer:** A

21. What is a key advantage of **using an Embedding layer** instead of one-hot vectors?

- A) It reduces dimensionality and captures word meaning

- B) It increases model complexity

- C) It ensures words are represented by integers

- D) It does not require labeled data

- **Answer:** A

22. How does the Mean layer **improve text representation**?

- A) It averages the embeddings of all words in a sentence

- B) It assigns a unique vector to each word

- C) It ensures all sentences have the same length

- D) It removes stop words

- **Answer:** A

23. What is an **important property** of the vectors produced by the Embedding layer?

- A) Similar words have similar vectors

- B) Every word has a unique integer index

- C) They are always 100-dimensional

- D) They do not change during training

- **Answer:** A