Sketch Classification

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Agenda

❖ Game Background
❖ Problem Statement
❖ Preprocessing
❖ Modeling
❖ Evaluation
❖ Conclusions

Game Background

❖ Quick, Draw! is a game developed by Google to help with machine learning. Players are prompted to draw 6 items & they are given 20 seconds to draw each item

❖ Google stores the drawings & makes them open source on their Creative Lab's GitHub

Problem Statement

❖ Image recognition has a wide variety of uses from self-driving cars to interpreting X-rays. Classifying handwritten characters is one of the most common uses & is used everyday in places like the Post Office. However, it is difficult to do correctly because nobody writes, or in our case draws, the same way & misclassification of a character can be significant.

Preprocessing

❖ Google offers the Quick, Draw! data in various formats

❖ Their raw files contain metadata we used in EDA

❖ We decided to use the Numpy bitmap format for modeling

  ➢ The images were resized & centered

❖ Our preprocessing was minimal: we just had to scale & resize the data

❖ The data is stored in an S3 bucket for the modeling stage

Modeling

❖ Convolutional portion: 2x convolutional layers + 1 MaxPool layer

❖ Dense portion: 2 dense layers

❖ We made heavy use of regularization:

➢ L_2 was included at each node

➢ Dropout & batch normalizing layers were added after each dense layer

➢ Early stopping was included when we fit the model
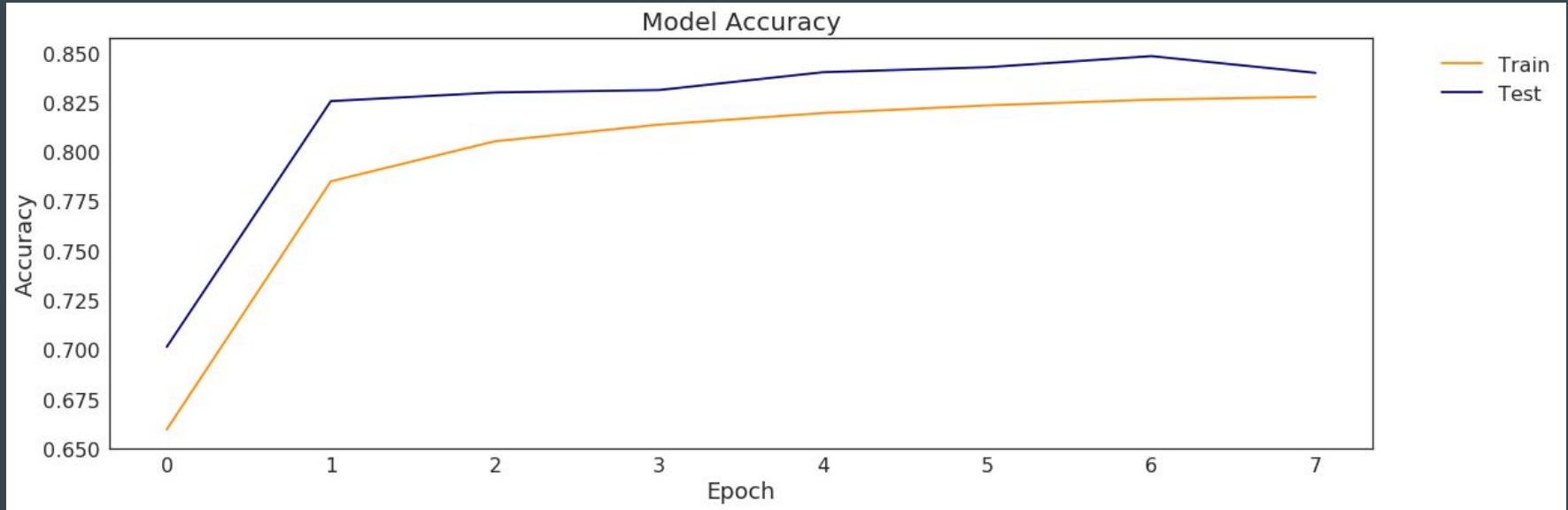
❖ The model was run in an AWS SageMaker instance
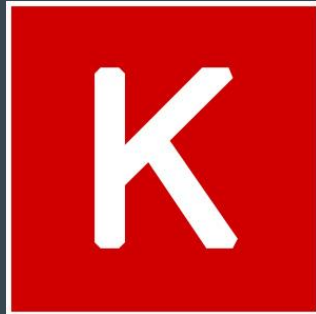
Evaluation

❖ The model was evaluated in three ways: metric scores, loss, & accuracy
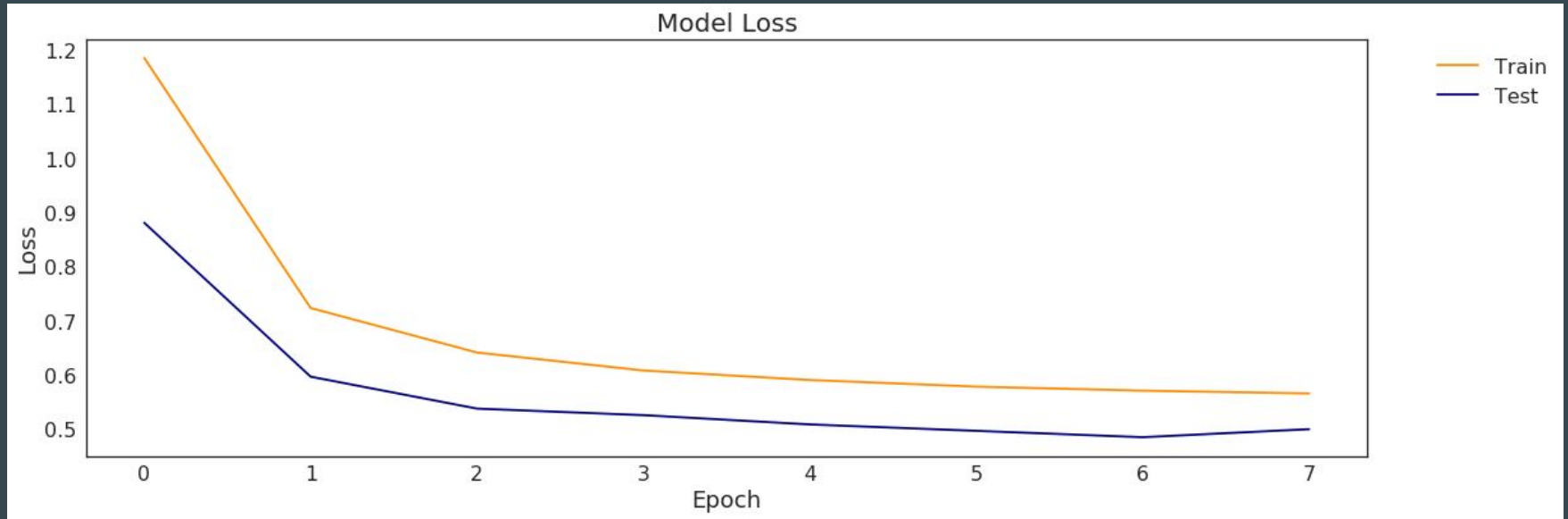❖ We could not create an ROC curve because we have 3 classes
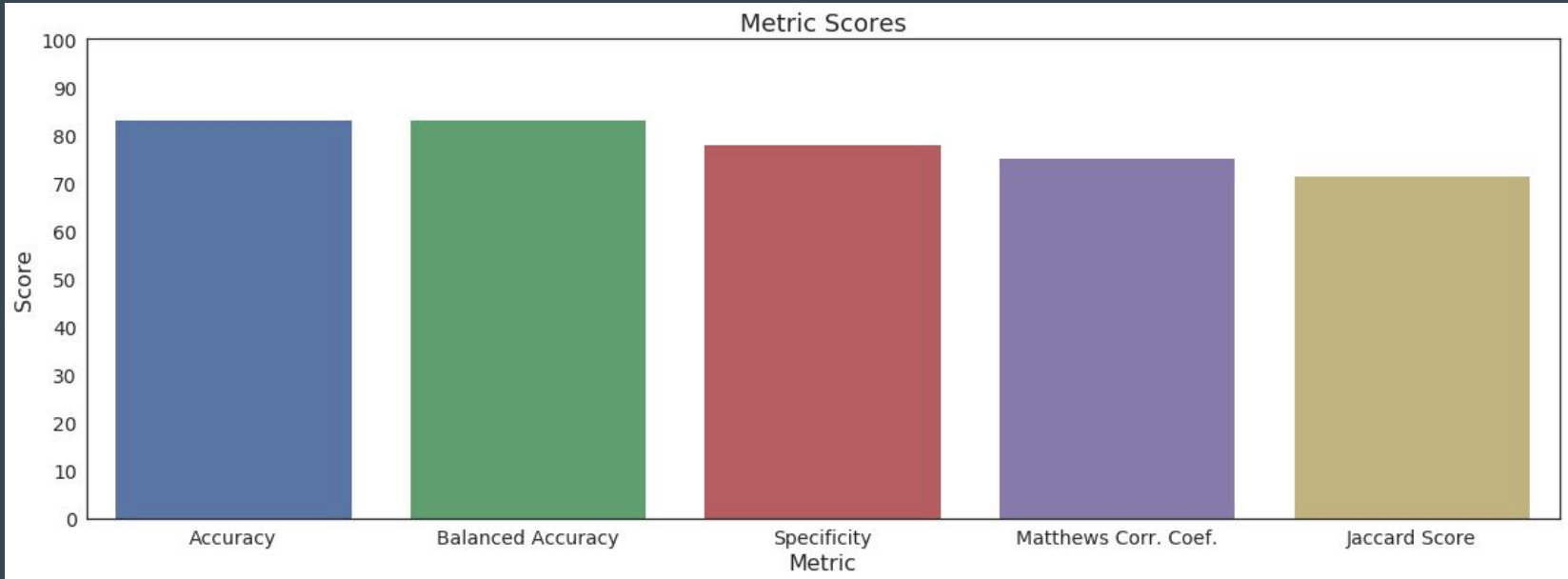
Evaluation

❖ Sharp improvements but stayed relatively flat with a drop into the eighth epoch when the early stopping took effect

Evaluation

❖ Sharp decrease in loss into the third epoch which then flattened but then increased going into the eighth when the early stopping took effect.

Conclusions

- ❖ Our model had okay performance, but has room for growth
- ❖ The data is not ideal: Google does not say *how* to draw the animals
- ❖ If the data were more consistent we would have better performance
- ❖ The images were also small: only 28x28 pixels
- ❖ Classifying the images is possible, but the data have to be better