PetFinder: Predicting Adoption Speed of Pets

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Outline

1. Motivation

2. Experiment

3. (Very Preliminary) Results

4. Discussion

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Motivation

1. In the midterm I used XGBoost to predict the adoption speed of pets. The quadratic weighted κ is 0.4694.
2. I did not consider the sparcity of the categorical variables such as the breed and color of the pets.
3. Therefore, in this project I employ an embedding layer to deal with the categorical variables and combine it with continuous features to build a neural network model.

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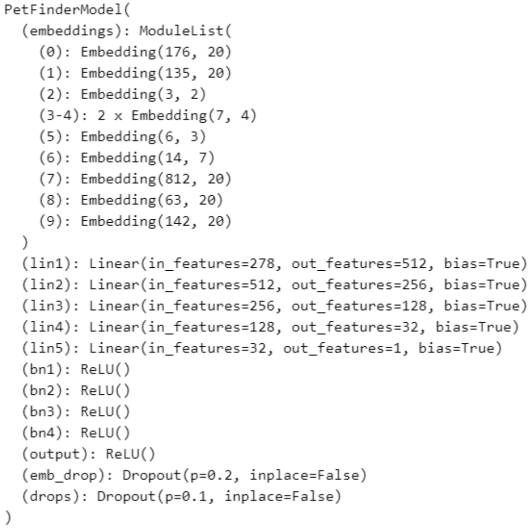
Experiment



```
PetFinderModel(
  (embeddings): ModuleList(
    (0): Embedding(176, 20)
    (1): Embedding(135, 20)
    (2): Embedding(3, 2)
    (3-4): 2 x Embedding(7, 4)
    (5): Embedding(6, 3)
    (6): Embedding(14, 7)
    (7): Embedding(812, 20)
    (8): Embedding(63, 20)
    (9): Embedding(142, 20)
  )
  (lin1): Linear(in_features=278, out_features=512, bias=True)
  (lin2): Linear(in_features=512, out_features=256, bias=True)
  (lin3): Linear(in_features=256, out_features=128, bias=True)
  (lin4): Linear(in_features=128, out_features=32, bias=True)
  (lin5): Linear(in_features=32, out_features=1, bias=True)
  (bn1): ReLU()
  (bn2): ReLU()
  (bn3): ReLU()
  (bn4): ReLU()
  (output): ReLU()
  (emb_drop): Dropout(p=0.2, inplace=False)
  (drops): Dropout(p=0.1, inplace=False)
)
```

Figure: Network

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Loss

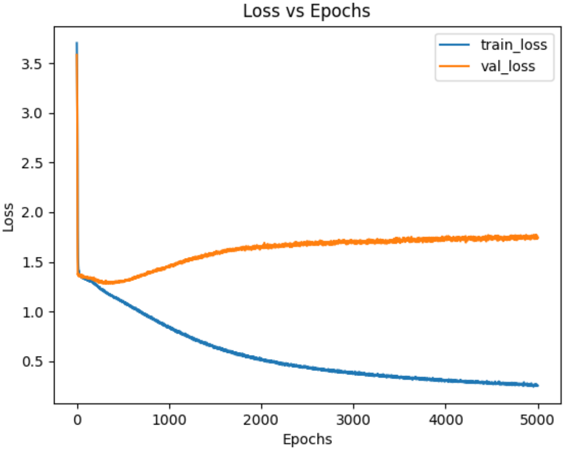

Figure: Loss (Stratified)

(Very Preliminary) Results

Weighted Kappa

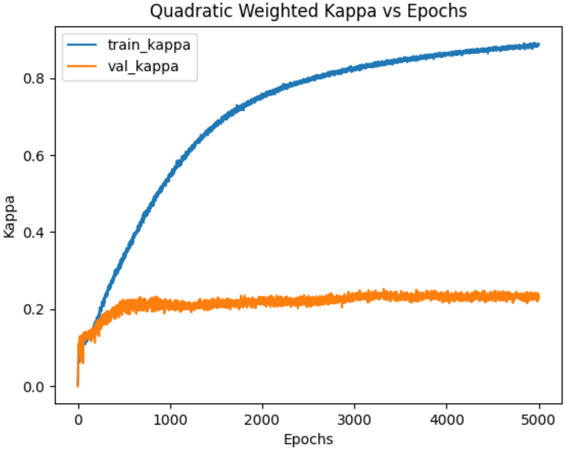

Figure: Kappa (Stratified)

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Discussion

1. The model is not good enough since the κ score is lower than the XGBoost model.
2. During the feature engineering process, many NaN values are generated. We need to find a way to deal with them in neural network since XGBoost can handle NaN values without any problem.
3. I try to fill the NaN by 0 and mean value, but the result is not good.
4. I might need to enlarge the network and add more layers.