Predicting Potential for Suicide from Reddit Posts with NLP

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Reddit C-SSRS Suicide (Problem definition)

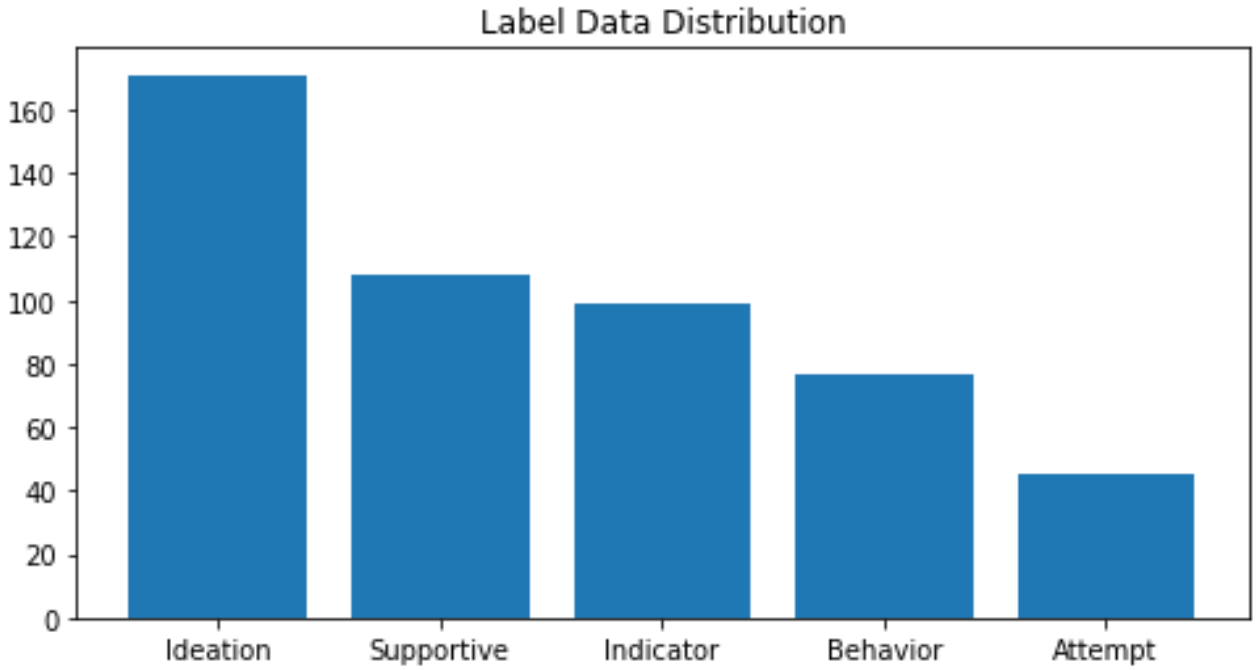
- Gold Standard Data Set:

  Reddit posts annotation by 4 practicing psychiatrists for getting information about suicidal tendencies and other related mental health conditions afflicting depressed users.

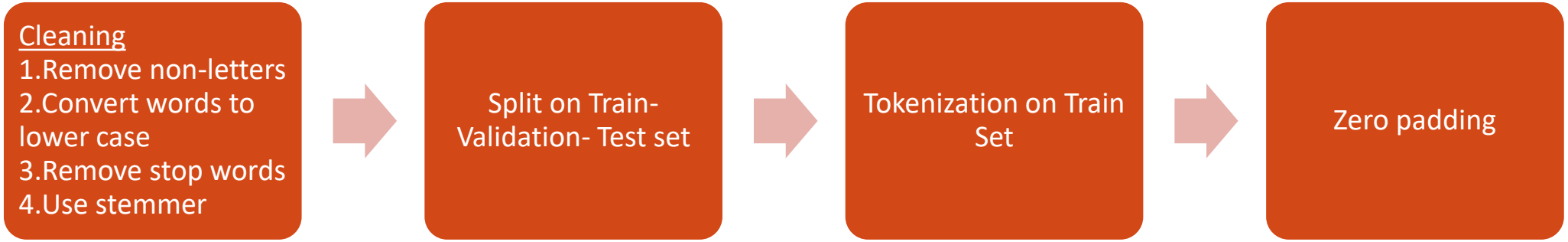
User ID	Post	Label
User-0	"['Its not a viable option, and youll be leaving your wife behind. Youd Pain her beyond comprehension. … . This is a big test for you, and youll pull through. Just try to stay as positive as you can and everything will work out.']"	Supportive
User-26	"['So your place could use a cleaning, I dont think that makes you evil. … 'Dont hate yourself. You are not hopeless.] "	Indication
User-1	"['It can be hard to appreciate the notion that you could meet someone else who will make you happy when you are so deeply in love with your boyfriend. … But you have to be willing to learn.']"	Ideation
User-2	"['Hi, so last night i was sitting on the ledge of my window contemplating whether or not i should jump. … But its only the people that keep living that get to experience it. ']",	Behavior
User-30	['Came back home about 2 hours ago...', 'It is true that there are people in this world who can love. … 'may be looking at my post history would help. There are just a few posts...']"	Attempt

Data Labels

- Label Scale: Supportive < Indicator < Ideation < Behavior < Attempt



Data preprocessing



- Word Embeddings from Glove (large open-source knowledge graph)

Problem formulation-evaluation

Ordered multi class classification problem

Solved as:

Classification

OR

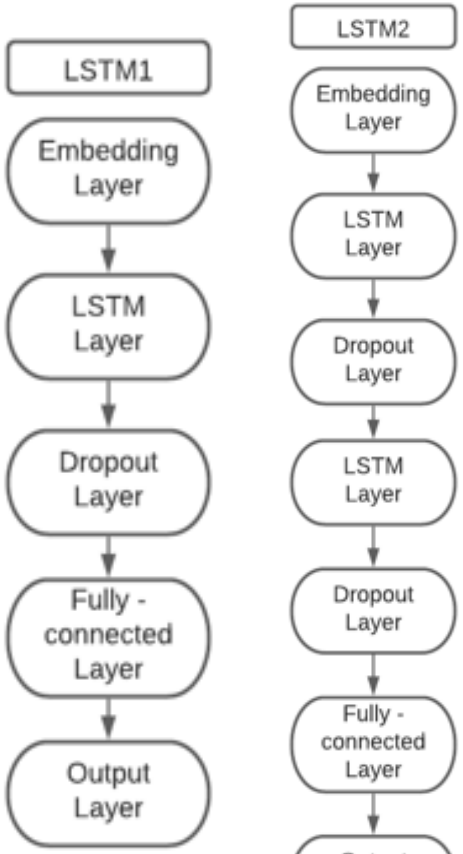
Regression?

Evaluation

Customized evaluation metric: CEM (Closeness Evaluation Measure)

- Informational closeness that depends on how items are distributed in the rank of classes
- The more unexpected it is to find an item between True and Predicted, the more information such an event provides.

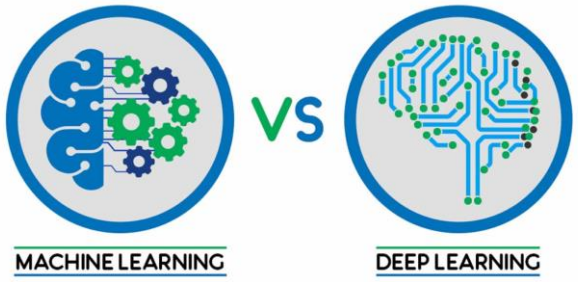
LSTM architectures



- Embedding Layer
  - Glove word embeddings of dimension 300
  - Max Post Length -> 3183
- LSTM Layers
  - Relu activation function
- Output Layer
  - Linear activation function
- ReduceonPlateau learning rate decay
- Early Stopping with patience=5

Results

- The regression predictions were rounded to integers
- $Pred = Round(f(x))$
- Evaluation: CEM (Closeness Evaluation Measure) for ordered classification
- Most architectures converged to a similar result: validation_loss = 1.5
- Results: 30% accuracy and 15 % Macro F1 score, 45% CEM
- The model learned the middle classes (1,2) very well
- Next step: Experiment with ML or gather more data




That's all Folks!