Naturalization of Text: Inserting Disfluencies

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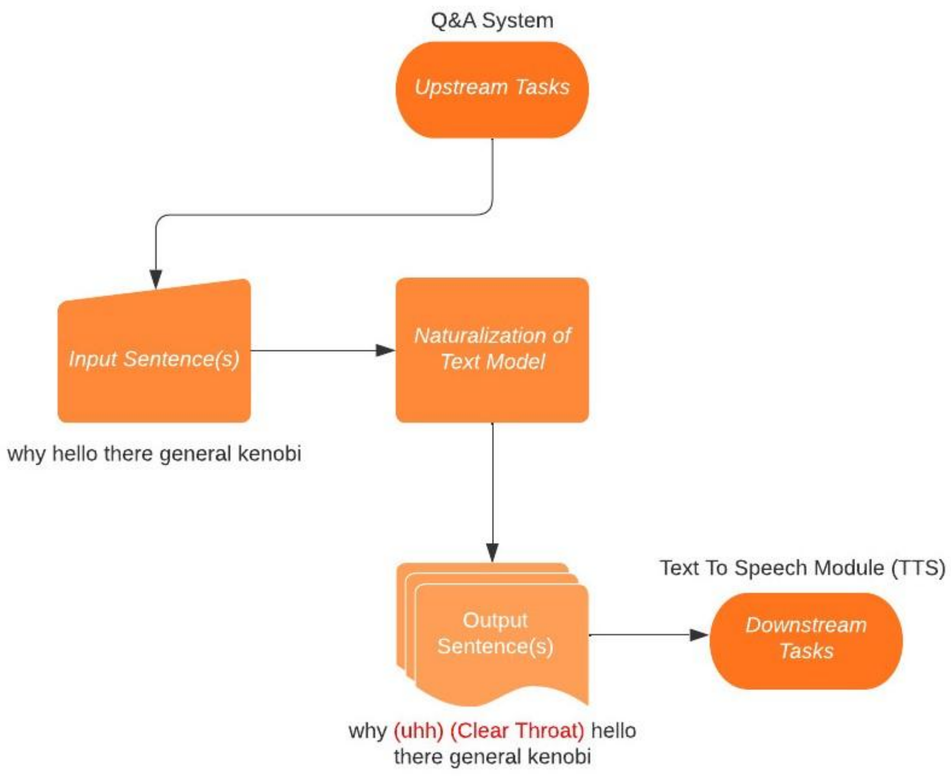
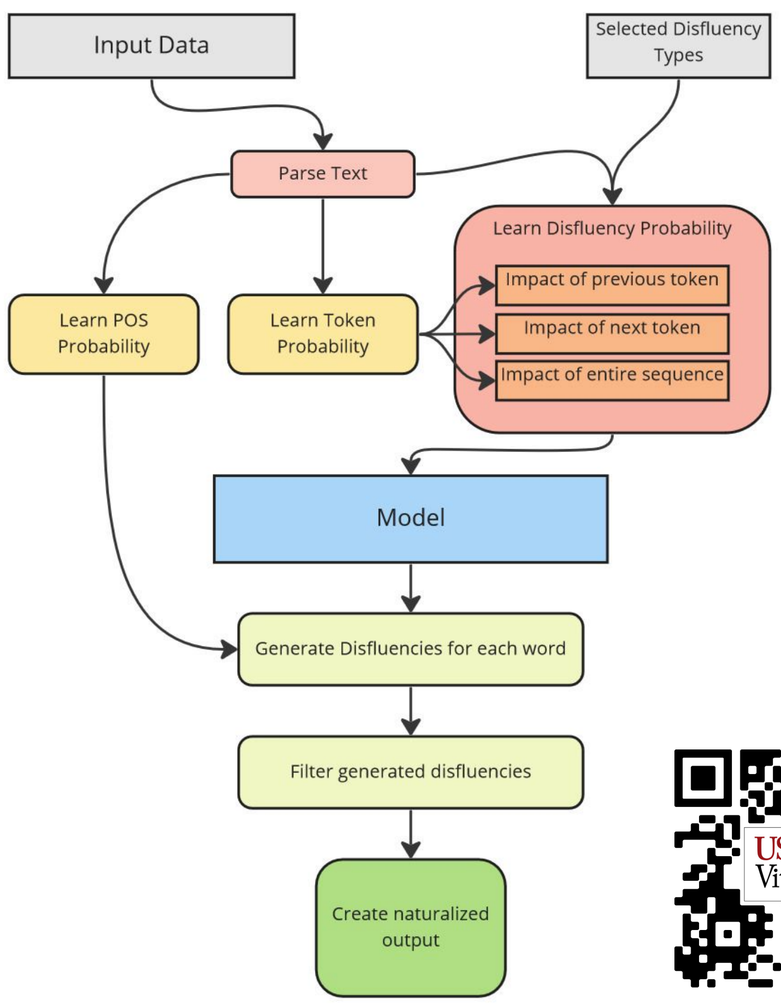
Introduction and Motivation

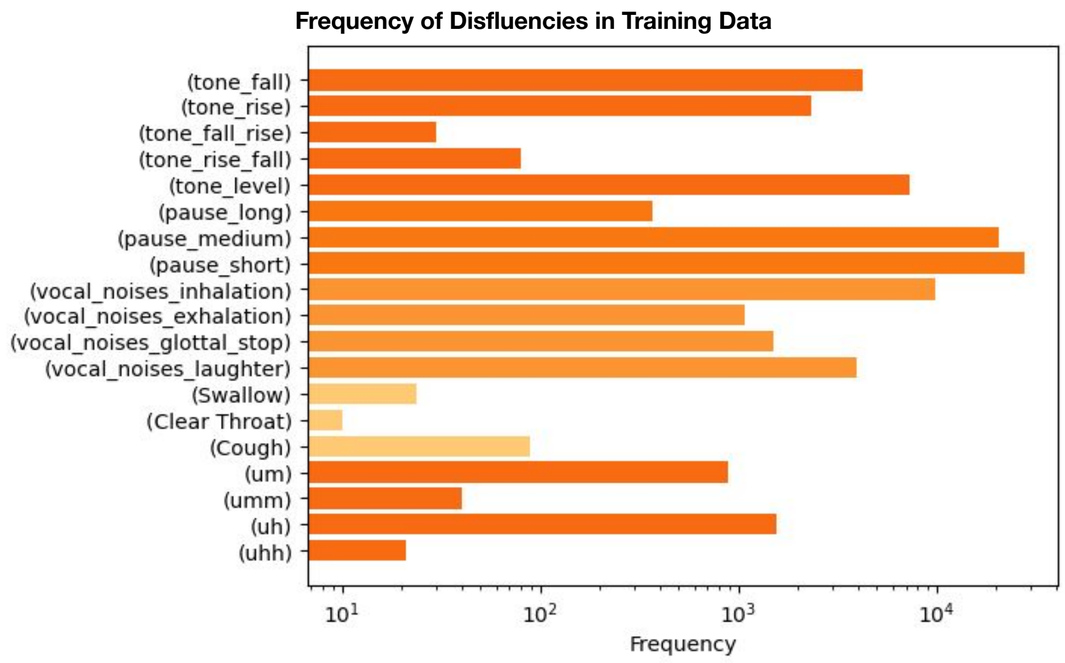
We aim to transform raw text documents of spoken dialogue / speech into its most natural-sounding version by augmenting these documents with disfluencies. Using various natural language processing techniques such as bi-grams and context analysis, we aim to create a model that can detect the most appropriate places in the document to insert these disfluencies and which form of it to insert. A successful implementation of the ideas examined in this project can aid in the efforts of naturalizing speech synthesis.



Methodology

Our method trained a model to make predictions based on the probabilities of disfluency usage and the tokens and corresponding parts-of-speech within the training corpus. We trained two types of models to insert disfluencies into text data. Our first model is a simple probabilistic model that uses bigram probabilities to predict and insert the disfluencies Our second model used a transformer based on the GPT-2 'Small' architecture that was fine-tuned on our disfluency training data. Despite using a more advanced architecture, the transformer-based model performed worse than the bigram model during disfluency selection.



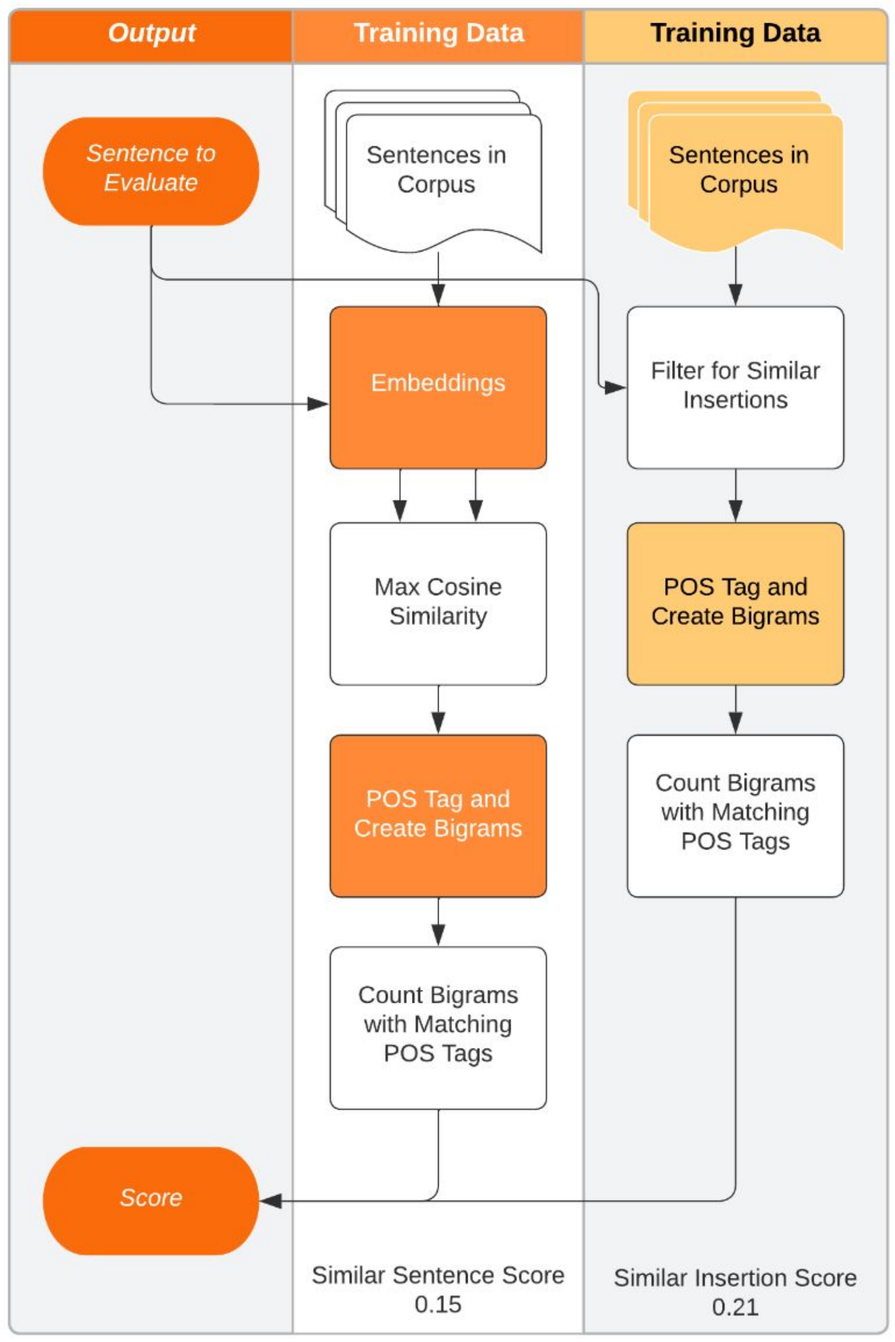


Evaluation & Results

The subject of this study is to produce text that sounds natural. Therefore, the ideal method to measure the model's performance would be to conduct a survey to receive feedback from real humans. Due to to scope limitations of the project, we implemented two automated scoring systems; similar sentence scoring and similar insertion scoring.

Test sentence: *It's just too bad*
Most similar corpus sentence: *It's too long*
Test sentence with insertions: *(pause_medium)* It's just *(vocal_noises)* too long.
Corpus sentence with insertions: *(pause_short)* It's too *(pause_short)* bad.

Test sentence	***(pause_medium, J') , (it's, NN)***	*(it's, NN), (just, RB)*	*(just, RB), (vocal_noises, VB)*	*(vocal_noises, VB), (too, RB)*	*(too, RB), (bad, JJ)*
Corpus sentence	***(pause_short, JJ), (it's, NN)***	*(it's, NN), (too, RB)*	*(too, RB), (pause_short, RB)*	*(pause_short, RB), (long, RB)*	-



Scan the QR Code to try out a working demo of our project!