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RESEARCH STATEMENT:

I'm a recent university graduate with an interest in contributing to deep understanding of conversational dialogue generation in natural language processing. Machine learning has successfully solved real world problems in natural language processing and dialogue generation. I'm always fascinated towards solving problems in real-world with cutting-edge technologies. I'm always passionate about mathematics and very much interested in solving problems on continuous optimization, vector calculus and probability distribution.

PREVIOUS EXPERIMENTS IN THE AREA OF CONTROLLED TEXT GENERATION:

I've previously worked on controlled text generation with seq2seq learning architecture under CPSC672. The objective of the research was to propose suitable metrics upon which the generated text at the decoder output could be observed and evaluated. I succeeded in presenting low-level to high level platforms such as diversity, coherence and engagingness of the target texts upon which the generated text was observed. The experiment was conducted on encoder-decoder based learning architecture with homologous GRU units.

However, variation at the decoder output was "controlled" with respect to Weighted Decoding (WD) algorithms including greedy search, beam search and top k-sampling methods. The biggest challenge was to introduce "randomness" at the generation to overcome generic and repetitive responses at the decoder output. So, we proposed adjustment of probability in P (target | source, z) at each timestep of the SoftMax distribution at the decoder which was controlled by introducing SoftMax "temperature" (τ) as a hyperparameter. Now, that the SoftMax distribution could be scaled by the parameter (τ) which makes the probability distribution, y-hat ($\hat{y}$) as uniformly distributed labels at each timestep at the decoder output. Observations were made at the generated texts and corresponding evaluations were reported.

FUTURE RESEARCH – AIM AND OBJECTIVE:

I'd like to address on the question that is currently an on-going problem among the Robot-Language understand world.

- How best to enable intelligent conversational tutor-agents to understand and respond in natural language with less interactions?

Upon conducting relevant researches in the field of conversational robot-agents there are a set of factors that affect the performance of the system including context identification, domain knowledge exploitation and also user intentions. (1)

In future I intend to collaborate natural language processing with Reinforcement learning taxonomy to solve the existing problem in conversational systems by focussing on minimizing the effect of context understanding through improved understanding of semantics in word utterances which in-turn entails understanding the entire situation.

POSSIBILE APPROACHES TO THE PROBLEM:

1. Reinforcement algorithms used for text-based games, navigational directions (2) could be studied and analyzed as they are highly capable of not generating similar responses for different context but rather understand the semantics of the utterances.
2. When a simple model like encoder-decoder model as mentioned in my previous experience is consider where decoder reconstructs the same utterance that the encoder gets as input. So, here the internal representations are constant sized. Thus, creating a language representation of constant-sized continuous utterance vectors with **"continuous"** reinforcement learning algorithms like Continuous actor-critic learning automation (CACLA), Deterministic Policy Gradient (DPG) and Deep Deterministic Policy Gradient (DDPG).

REFERENCES:

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2. Improving Grounded Natural Language Understanding. Thomason∗, Jesse. 2019, International Conference on Robotics and Automation (ICRA), p. 8.