NLP Project Phase #2
(Project High Level Architecture and Literature Survey)

Project Title : News Translator and Summarizer
Project ID : 16
Project Team :

Name	SRN
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Outline

- Abstract
- Motivation Scope of the Project
- Suggestions from Review – 1
- Literature Survey (6 papers) (Individual information is mandatory)
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Abstract

Speech-text news translator and summariser

- In a multilingual country like India, although accessing news is easy, it can be a challenge for people to translate it into their suitable language and then summarise the meaning out of it.
- We would like to solve this issue and provide a platform for people to understand news that could have not been comprehendible before.
- Text to speech translation will help with extracting insights for the users.
- Our project focuses on building a model that can help with such challenges.

Motivation and Scope of the Project

- In the post-modern word, translation has become so relevant that people visualize it as a socio-cultural bridge between communities and countrie
- Translation has helped knit India together as a nation throughout her history. Ideas and concepts like 'Indian literature', 'Indian culture', 'Indian philosophy' and 'Indian knowledge systems' would have been impossible in the absence of translations
- Helps people to read and understand news from various parts of the country and different part of the world as well.
- Regional and International news can be understood easier

Suggestions from Review – 1

- We were asked to include speech to text functionality in our project.
- We have read a few research papers incorporating the same applications into their models and we hope to have implemented more by the next phase.

Literature Survey

- Each student is supposed to give a critical assessment of two research papers that has been conducted on the topic.
- 6 recently published research papers/products.(IEEE, ACM, Springer, Elsevier conference papers and Journal papers) containing a blend of NLP and ML papers
- Summarize the individual papers/products with as much detail as each deserves, depending up on its relative importance in the overall literature on the topic.
- Literature Survey should be in table format as mentioned in next slide

Individual Information on Literature Survey

S.N.	Name of the Student	SRN	Paper	Paper Title
1	Navya Agrawal	PES2UG19CS250	1	Attend, Translate and Summarize: An Efficient Method for Neural Cross-Lingual Summarization.
			2	Real-Time Speech-To-Text / Text-To-Speech Converter With Automatic Text Summarizer using Natural Language Generation And Abstract Meaning Representation.
2	Samyak Maurya	PES2UG19CS360	3	Hindi to English Transfer Based Machine Translation System
			4	On Extractive and Abstractive Neural Document Summarization with Transformer Language Models
3	Vaibhav G	PES2UG19CS443	5	DiscreTalk: Text-to-Speech as a Machine Translation Problem
			6	Systems for the News Translation Task in WMT 2017

Literature Survey

Paper-1

Paper Details (Citation)	Objective of paper, Techniques/Methods	Detailed explanation along with results	Limitations
Attend, Translate and Summarize: An Efficient Method for Neural Cross-Lingual Summarization. Junnan Zhu , Yu Zhou , Jiajun Zhang , Chengqing Zong. 2020 Association for Computational Linguistics.	•Cross-lingual summarization aims at summarizing a document in one language into another language. •We first use encoder-decoder attention distribution to attend to some words and obtain the translation candidates from a probabilistic bilingual lexicon. •Then a translating probability p(trans) is calculated, which balances the probability of generating words from the neural distribution with that of selecting words from the translation candidates of the source text. •The final distribution is obtained by the weighted sum (weighed by p(trans) of the neural distribution PN and the translation distribution PT	• This method first attends to the source words, then obtains the translation candidates, and incorporates them into the generation of the final summary. • Experimental results have shown that our method can significantly outperform the baseline and achieve comparable performance with the state-of-the-art.	• This method doesn't incorporate into the multi-task method. • Only covers summarization and we require much more functionalities.

Literature Survey

Paper-2

Paper Details (Citation)	Objective of paper, Techniques/Methods	Detailed explanation along with results	Limitations
Real-Time Speech-To-Text / Text-To-Speech Converter With Automatic Text Summarizer using Natural Language Generation And Abstract Meaning Representation. K. P. Vijayakumar, Hemant Singh, Animesh Mohanty.	• Calculation of CTC Loss Function • Batch Normalization • Deep Speech 2 • AMR Parsing • Google Text-to-Speech Engine	• For the Speech recognition system, the performance metric used is WER. • The speedup achieved by the speech recognition is 4x-21x, depending on the processing unit used, and the accuracy of the summarizer is 99.37 %.	• The dataset used for summarization is CNN/Dailymail, which comprises of news articles. However, there is a need to summarize the spoken text, and there are no such suitable datasets available, which can significantly improve the output. • There is still a need to have better quality AMR parsers and generators. • To train different models, there was extensive use of GPUs.

Literature Survey

Paper-3

Paper Details (Citation)	Objective of paper, Techniques/Methods	Detailed explanation along with results	Limitations
Hindi to English Transfer Based Machine Translation System Akanksha Gehlot, Vaishali Sharma, Shashi Pal Singh, Ajai Kumar arXiv:1507.02012	• Objective was translation of hindi text to english. • Methods used was transfer learning and CYK algorithm along with adjustments for few special cases.	• The input text was first converted to its sentence abstract representation • CYK algorithm was then used on leaf nodes for direct translation and transliteration.	• Generating CFG for languages is difficult and very few sources are present with research towards it. • Metonymy ambiguity cannot be solved with CFG

Literature Survey

Paper-4

Paper Details (Citation)	Objective of paper, Techniques/Methods	Detailed explanation along with results	Limitations
On Extractive and Abstractive Neural Document Summarization with Transformer Language Models Sandeep Subramanian, Raymond Li, Jonathan Pilault, Christopher Pal arXiv:1909.03186	• aims to use abstractive summarization for long documents that exceed several thousand words • Encoder-decoder architecture	• a hierarchical document representation model that either points to or classifies sentences in a document to build an extractive summary • a transformer language model that conditions on the extracted sentences as well as a part of or the entire document. • Gave a confidence of 95% on 4 tested summarization datasets	• abstractive summary for selecting tokens can tend to repeat throughout the document summarizing only a certain portion of it. • abstractive summaries generated by transformers can generate imaginary content. • extensive use of hardware like gpu's

Paper-5

Literature Survey

Paper Details (Citation)	Objective of paper, Techniques/Methods	Detailed explanation along with results	Limitations
DiscreTalk: Text-to-Speech as a Machine Translation Problem Tomoki Hayashi1,2 , Shinji Watanabe3 1Human Dataware Lab. Co. Ltd., Japan 2Nagoya University, Japan 3 Johns Hopkins University, USA	• Aims to convert text to speech • Non-autoregressive vector quantized variational autoencoder (VQVAE) model: • Advanced decoding techniques 1. beamsearch 2. shallow fusion 3. language model (LM) 4. subword unit commonly used in NMT and ASR fields	• The VQ-VAE model learns a mapping function from a speech waveform into a sequence of discrete symbols, and then the Transformer-NMT model is trained to estimate this discrete symbol sequence from a given input text. • various techniques developed in NMT and automatic speech recognition (ASR) such as beam search, subword units, and fusions with a language model • we can avoid an over smoothing problem of predicted features, which is one of the common issues in TTS • 1) the proposed model outperforms the conventional Transformer-TTS with Parallel WaveGAN in naturalness 2) the use of subword unit is effective, especially in the case of the small downsampling factor 3) there is a trade-off between the resolution of discrete symbols and speech articulation	• Trade-off between the resolution of discrete symbols and speech articulation. • This framework is not extended to a multi-speaker model • Not yet suitable for large scale corpus to clarify the effectiveness of VQ-LMs

Literature Survey

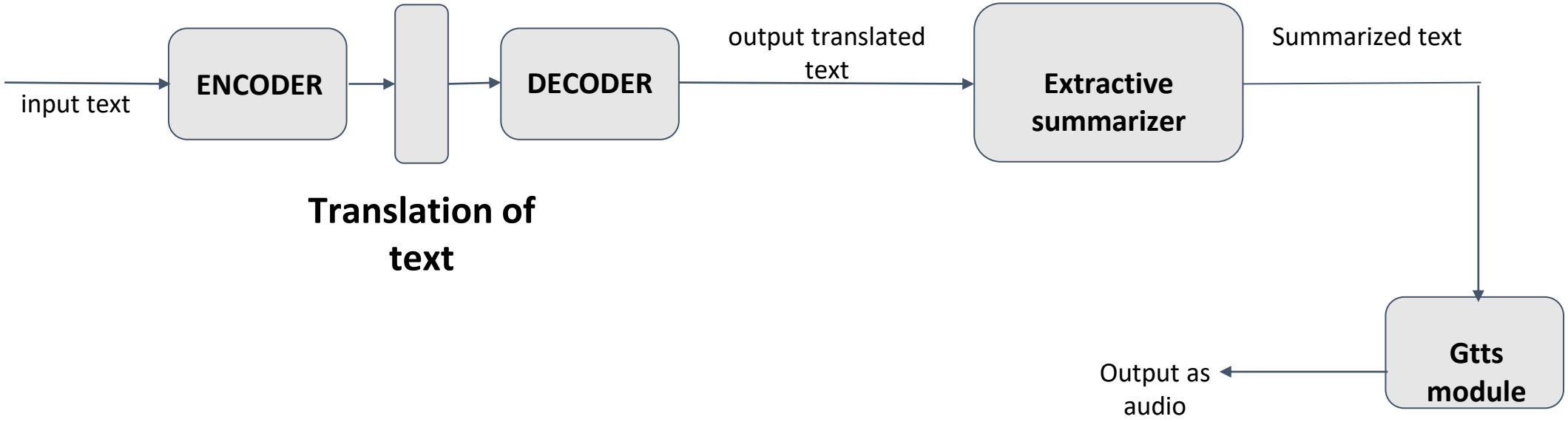
Paper-6

Paper Details (Citation)	Objective of paper, Techniques/Methods	Detailed explanation along with results	Limitations
The Karlsruhe Institute of Technology Systems for the News Translation Task in WMT 2017 Ngoc-Quan Pham, Jan Niehues, Thanh-Le Ha, Eunah Cho, Matthias Sperber, Alexander Waibel Karlsruhe Institute of Technology, Karlsruhe, Germany	• News translation in three different directions,German→English, English→German and English→Latvian • Models used are Encoder-decoder based neural machine translation models	• Used a eTorch-based toolkit OpenNMT • All models trained with this toolkit have two LSTM layers of 1,024 units each and also use the input-feeding method • For optimization, the gradients are scaled at 5, and we experimentally use Adam with a high learning rate of 0.001 and then reduce it to 0.0005 when the perplexity of the model does not decrease anymore. • Checkpoints are saved every epoch and also enhanced the toolkits with different features, namely the Context Gate for attentional model and using coverage information during learning to translate • The most consistent gain mostly comes from system ensembling/combinati	• One of the main problems of current NMT system is its limited vocabulary generating difficulties when translating rare words • A successful technique is to ensemble different checkpoints of a model or models with different random initialization. While this is a very helpful technique, it has a drawback that it can only be performed for models using the same input and output representation

Summary :Learning from Literature Survey

- After research from all the above articles, we plan to use encoder decoder model for both translation and summarization as well as a specialised VQ-VAE and advanced decoder to conver text to speech.
- high level design can be seen in the following slide.

High Level Architecture Diagram/ Detailed Flowchart



Work Done so far

- We had started off our project with a brief introduction to encoder-decoder architecture and after going through various research papers we have decided to implement them.
- Currently we are working on fixing inputs for the three phases ie implementing sequence2sequence and word embeddings for encoders

Thank You

References

- https://www.geeksforgeeks.org/multilingual-google-meet-summarizer-python-project/
- https://www.analyticsvidhya.com/blog/2019/06/comprehensive-guide-text-summarization-using-deep-learning-python/