

# MedicBot: A New Virtual Assistance for the Children with Auditory Processing Disorder

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# Overview

1 Introduction

2 Methodology

3 Techniques

- Auditory processing is defined as what we do with what we hear <sup>1</sup>
- Auditory Processing Disorder (APD) is a condition where someone has normal hearing, but the auditory system does not faithfully bring information to the brain <sup>2</sup>
- **Approximate 2-4% of school age children have APD** <sup>3</sup>

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<sup>1</sup>Katz & Tillery, 2004

<sup>2</sup><https://www.sac-oac.ca>

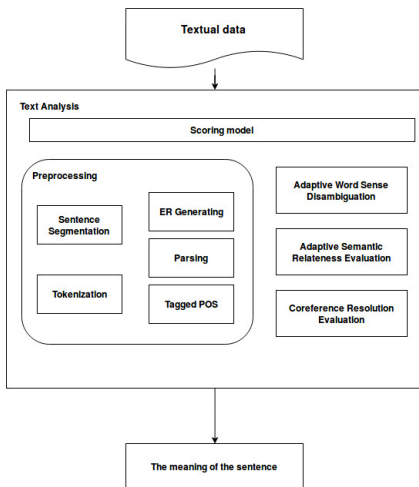
<sup>3</sup><http://www.ementalhealth.ca/>

Propose an AI model (virtual assistance) to assist in diagnosing, monitoring, and training of the children with APD problem

- Diagnose APD symptoms based on conversation with the considered children
- Create a Training Therapy Model Assistance (adaptable)
- Build the Reinforcement Learning (RL) Model to monitor the progress of APD treatment

- Analysis the given APD symptoms by speech recognition based on Deep learning
- Analysis the given APD therapy and recommend the treatment to the APD children. Apply a natural language processing (NLP) to generate sentences and exploit Deep learning to understand the context of the speech
- Monitoring the process of APD treatment by using speech analysis based on Deep learning

## Proposal for the objective 1 solution

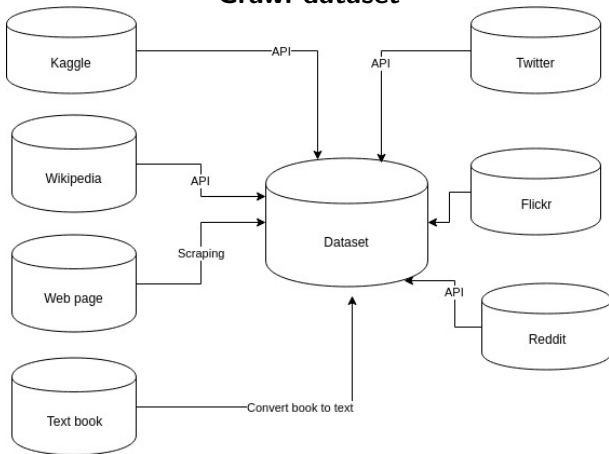


- Step 1: Get the raw text data from the user conversation
- Step 2: Process text go extract and compute the score of features based
- Step 3: Adapt word sense disambiguation
- Step 4: Evaluate the semantic relatedness and coreference resolution
- Step 5: Get the meaning of the sentence

## Open Dataset

- (NLVR) A Corpus of Natural Language for Visual Reasoning, 2017
- (MS MARCO) MS MARCO: A Human Generated MACHine Reading COMprehension Dataset, 2016
- (NewsQA) NewsQA: A Machine Comprehension Dataset, 2016
- (SQuAD) SQuAD: 100,000+ Questions for Machine Comprehension of Text, 2016
- (GraphQuestions) On Generating Characteristic-rich Question Sets for QA Evaluation, 2016
- (Story Cloze) A Corpus and Cloze Evaluation for Deeper Understanding of Commonsense Stories, 2016
- (Children's Book Test) The Goldilocks Principle: Reading Children's Books with Explicit Memory Representations, 2015
- (SimpleQuestions) Large-scale Simple Question Answering with Memory Networks, 2015
- (WikiQA) WikiQA: A Challenge Dataset for Open-Domain Question Answering, 2015
- (CNN-DailyMail) Teaching Machines to Read and Comprehend, 2015
- (QuizBowl) A Neural Network for Factoid Question Answering over

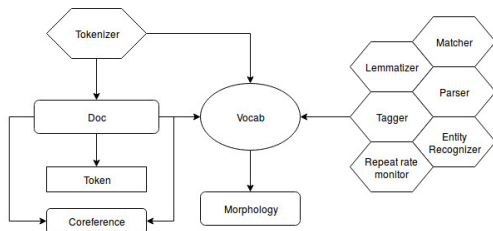
## Crawl dataset



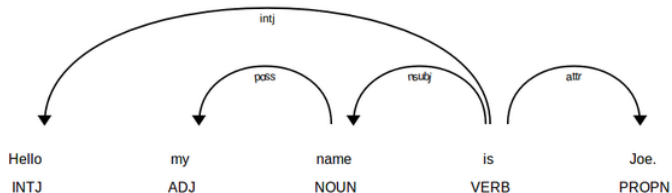


## Preprocessing

- Recognize the subject, verb, object in a given sentence
- Recognize noun, adj, adv, preposition of a sentence
- Recognize the entities in a sentence
- Recognize the coreference of a sentence



# Unit tests of the system

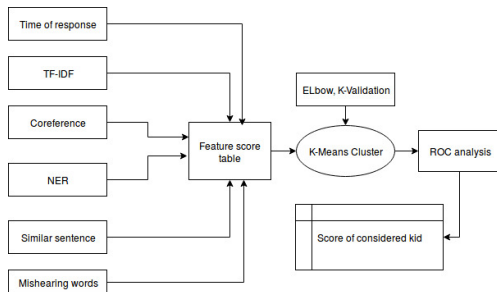


But **Google** **ORG** is starting from behind. The company made a late push **GPE** into hardware, and **Apple** **ORG** 's Siri, available on **iPhones** **PRODUCT**, and **Amazon** **ORG** 's **Alexa** **ORG** software, which runs on its **Echo** **GPE** and **Dot** **ORG** devices, have clear leads in **GPE** consumer adoption.

```
text 1: My sister has a dog.
text 2: She loves him
0.016491954893255212 a dog loves him
0.9719385606143631 my sister loves him
0.011569484492381571 she loves him
```

## Scoring model

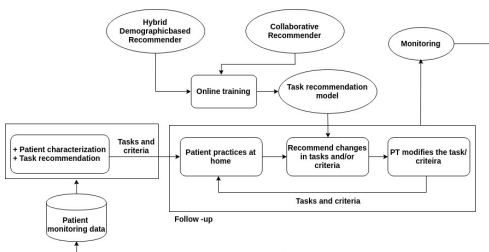
- Create the features for the scoring model
- Compute the score for these ones
- Using the K-Mean Clustering algorithm to cluster the kid
- Apply the Elbow and K-validation algorithm to optimize the K-value of K-Mean Clustering algorithm
- Make the score table of considered kids



time of response	$\sum_{t=0}^T(t_i)$ , $t_i$ the duration of one sentence
tf-idf(k,d,D)	$tf(k, d) \times idf(k, D)$ , $k$ : term $k$ $d$ : document $d$ ; and $d \in D$
coreference	coreference resolution evaluation
ner	name entity recognition
similar sentence	similarity evaluation
mishearing word	spelling and grammar checking evaluation
elbow algorithm	choose a small value of $k$ that still has a low SSE
ROC analysis	Receiver Operating Characteristic analysis

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- Monitoring the process of APD treatment by using speech analysis based on Deep learning

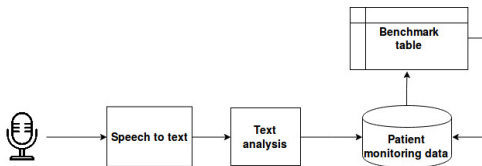
## Proposal for the objective 2 solution



- Propose a training therapy to the APD kid based on the diagnosing report and Task recommendation model
- Monitor the progress of therapy
- Update the monitoring data
- Suggest the fit training therapy by using reinforcement learning based on recommendation system

- Analysis the given APD symptoms by speech recognition based on Deep learning
- Analysis the given APD therapy and recommend the treatment to the APD children. Apply a natural language processing (NLP) to generate sentences and exploit Deep learning to understand the context of the speech
- Monitoring the process of APD treatment by using speech analysis based on Deep learning

## Proposal for the objective 3 solution



- Convert the APD speech to text
- Analysis the meaning of the text
- Compute the score of the benchmark A