

MINOR PROJECT PRESENTATION



IOE - Central Campus, Pulchowk
August, 2017

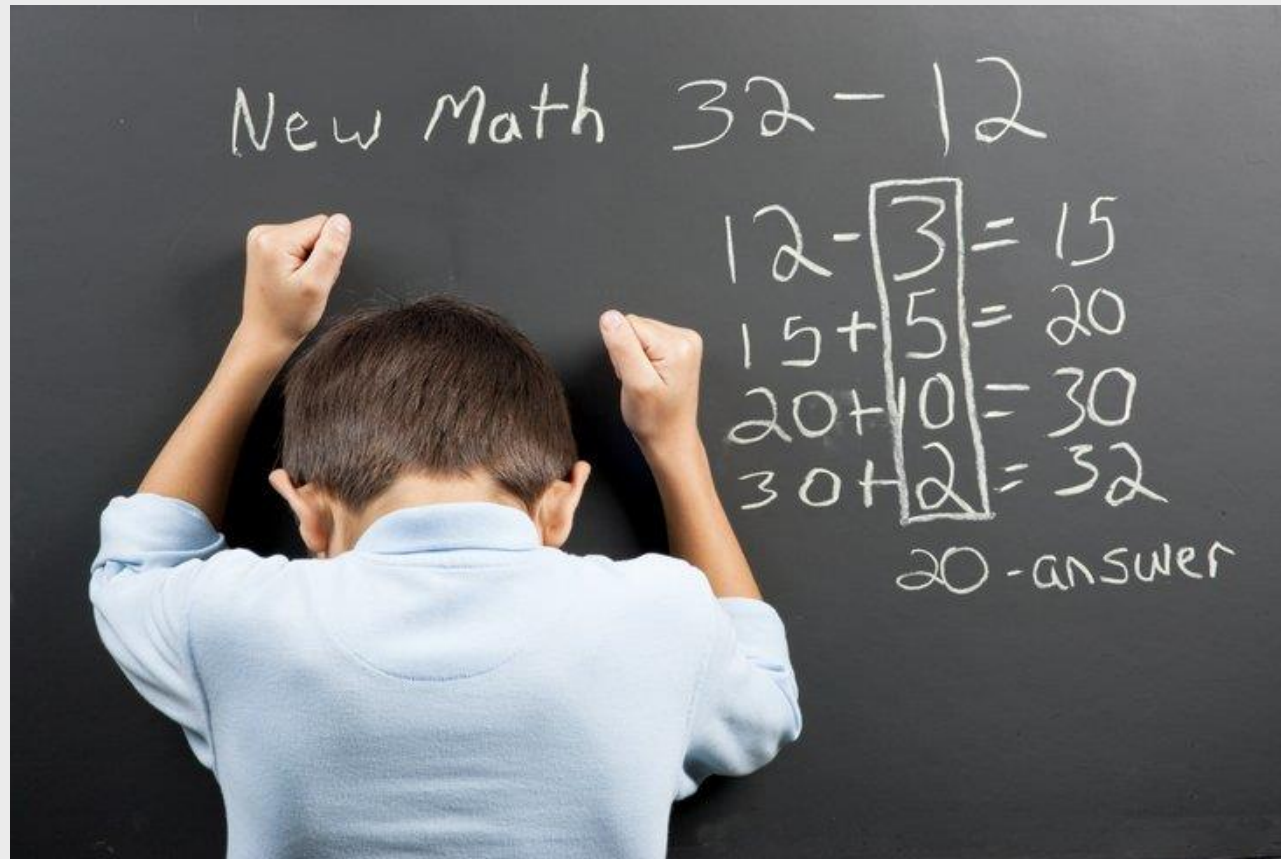
Math Word Problem Solver

Anish Parajuli (071-BCT-503)

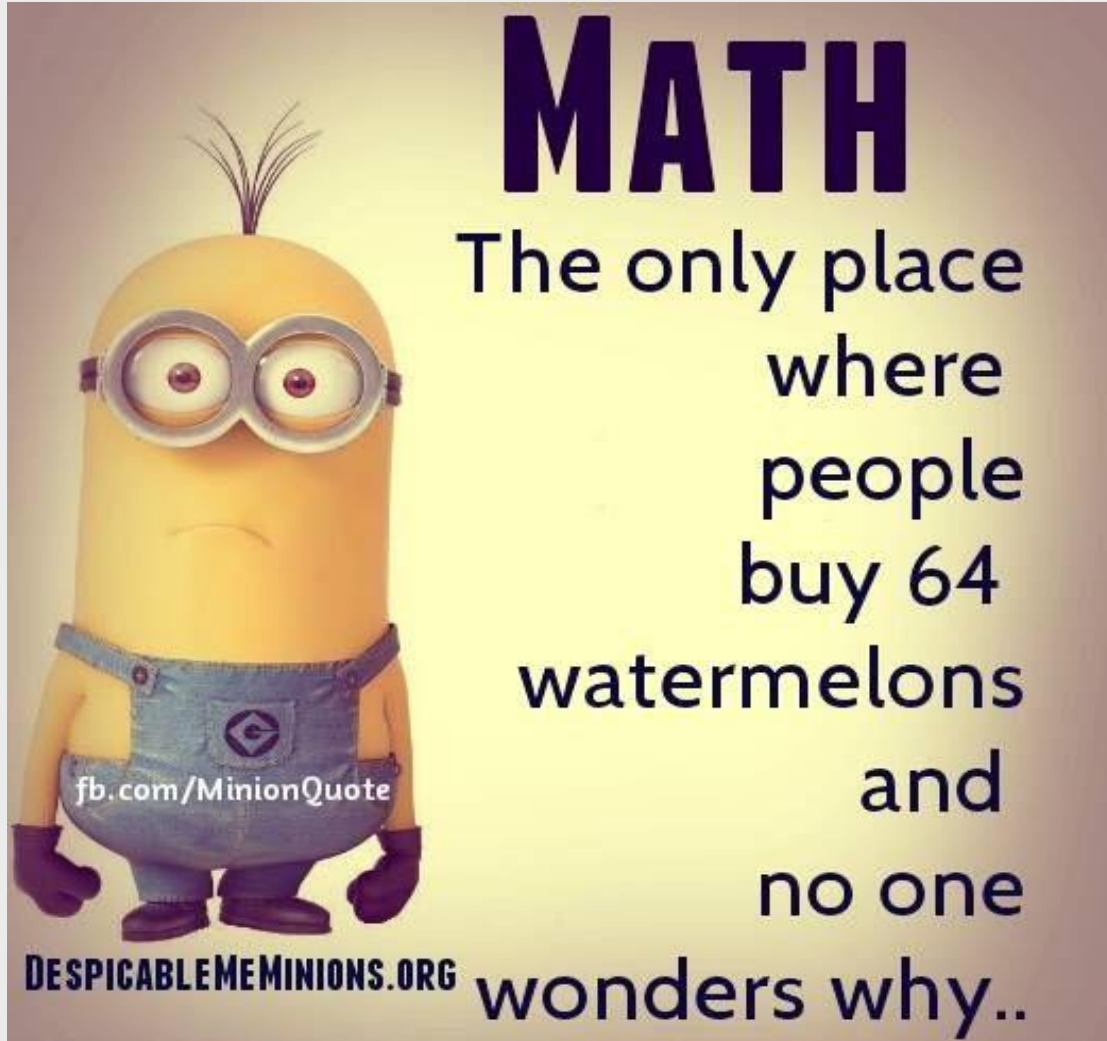
Prasidha Karki (071-BCT-527)

Satyarth Upadhyaya (071-BCT-536)

Sudip Bhattarai (071-BCT-544)



“Arithmetic is being able to count up to twenty without taking off your shoes.” - **Mickey Mouse**



Outlines

- ▶ Problem Statement
- ▶ Objectives
- ▶ NLP
- ▶ Methodology
- ▶ Mechanism
- ▶ Results
- ▶ Limitation
- ▶ Future Work
- ▶ Application

Problem Statement

- ▶ Difficult to understand phrases and concept used in math
- ▶ Challenging for child who have difficulty staying focused or controlling impulses

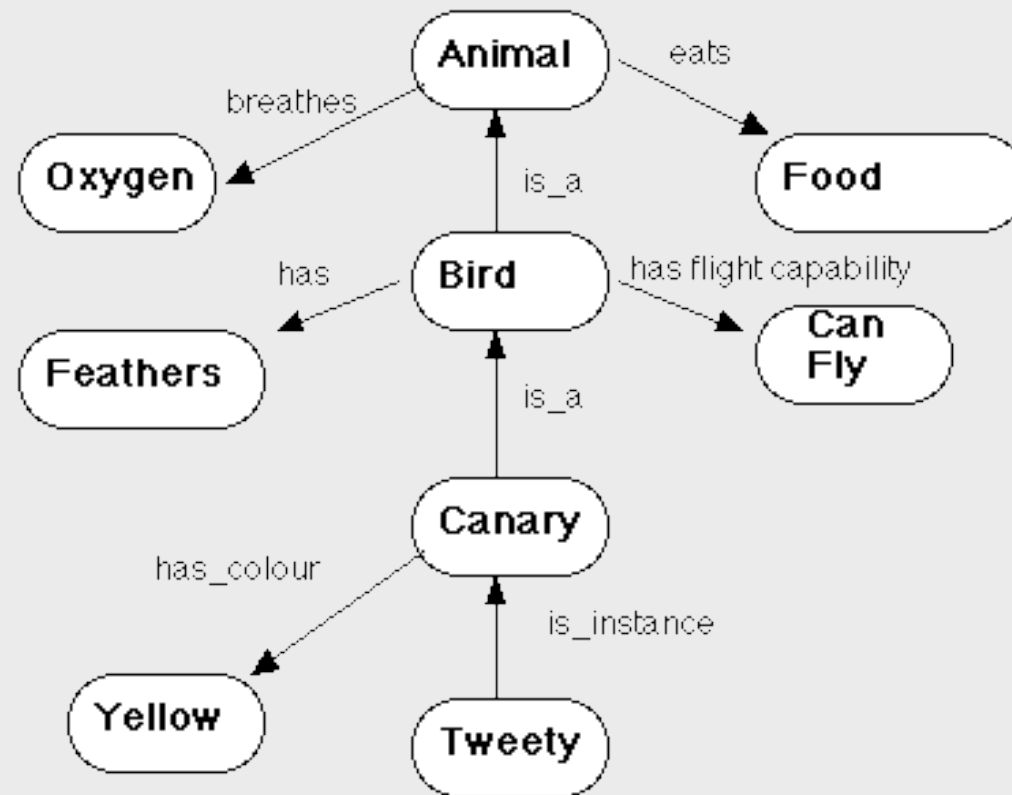
Objectives

- ▶ Learning math word problem in interactive way
- ▶ To generate required equation for provided word problem
- ▶ Solve those equation to answer the word problems

Natural Language Processing

- ▶ Semantic interpretation
- ▶ Information extraction
- ▶ Feature set

Semantic Network




Math Word problems processing

- ▶ Verbs
- ▶ Numbers
- ▶ Equation template

Equation Template

Mike has 10 apples. He eats 6 of them. How many apples does he have now?

$$X = N0 - N1$$


Learning to map word problems to equations

- ▶ Classification problem
- ▶ Probabilistic inference models
- ▶ Neural Network models
- ▶ Values substitution in equation

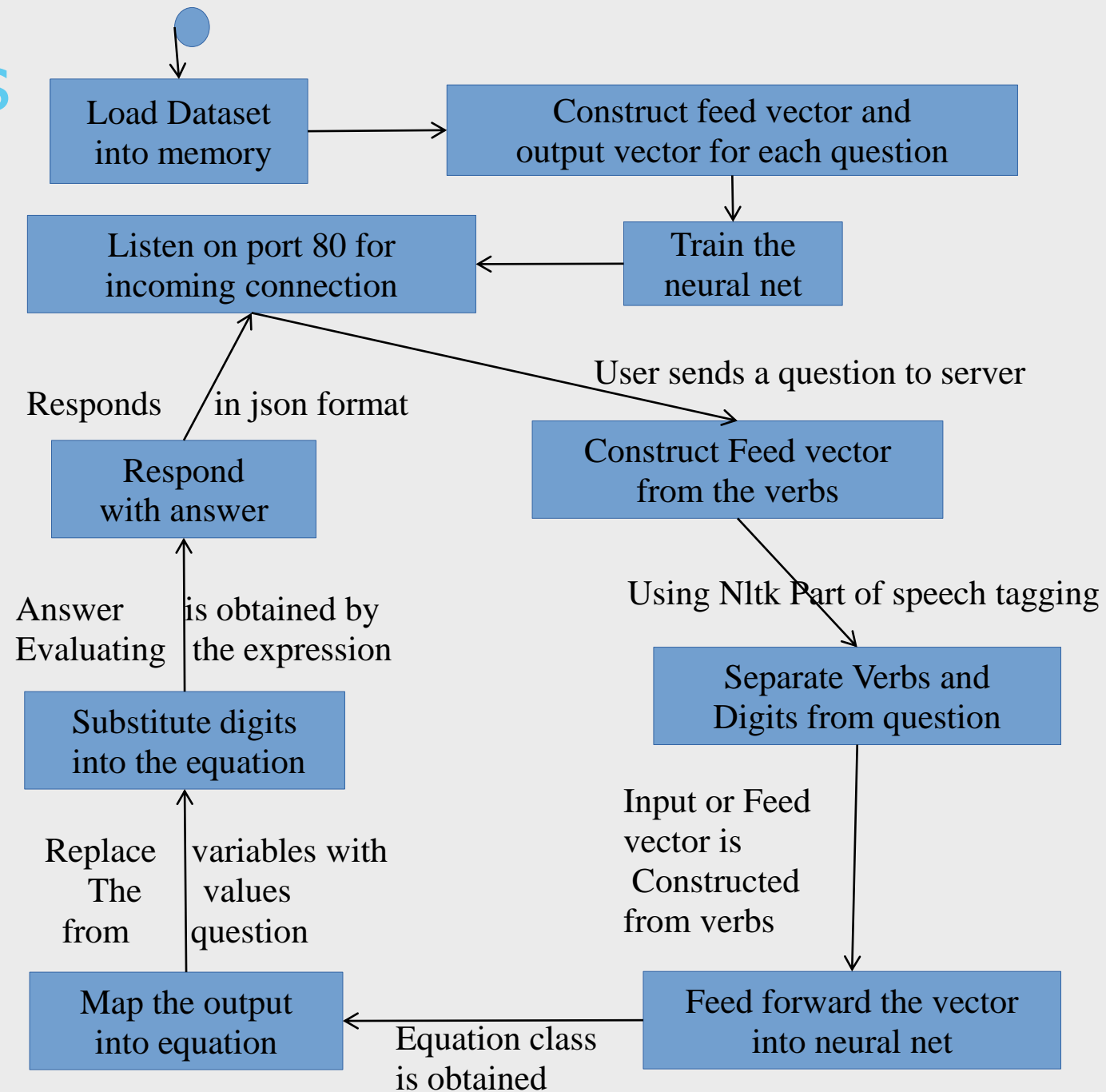
Understanding a Question

- ▶ Separate verbs from the question.
- ▶ construct a vector representing the verbs for neural net.
- ▶ Feed the vector to neural net.
- ▶ select the equation with the highest probability

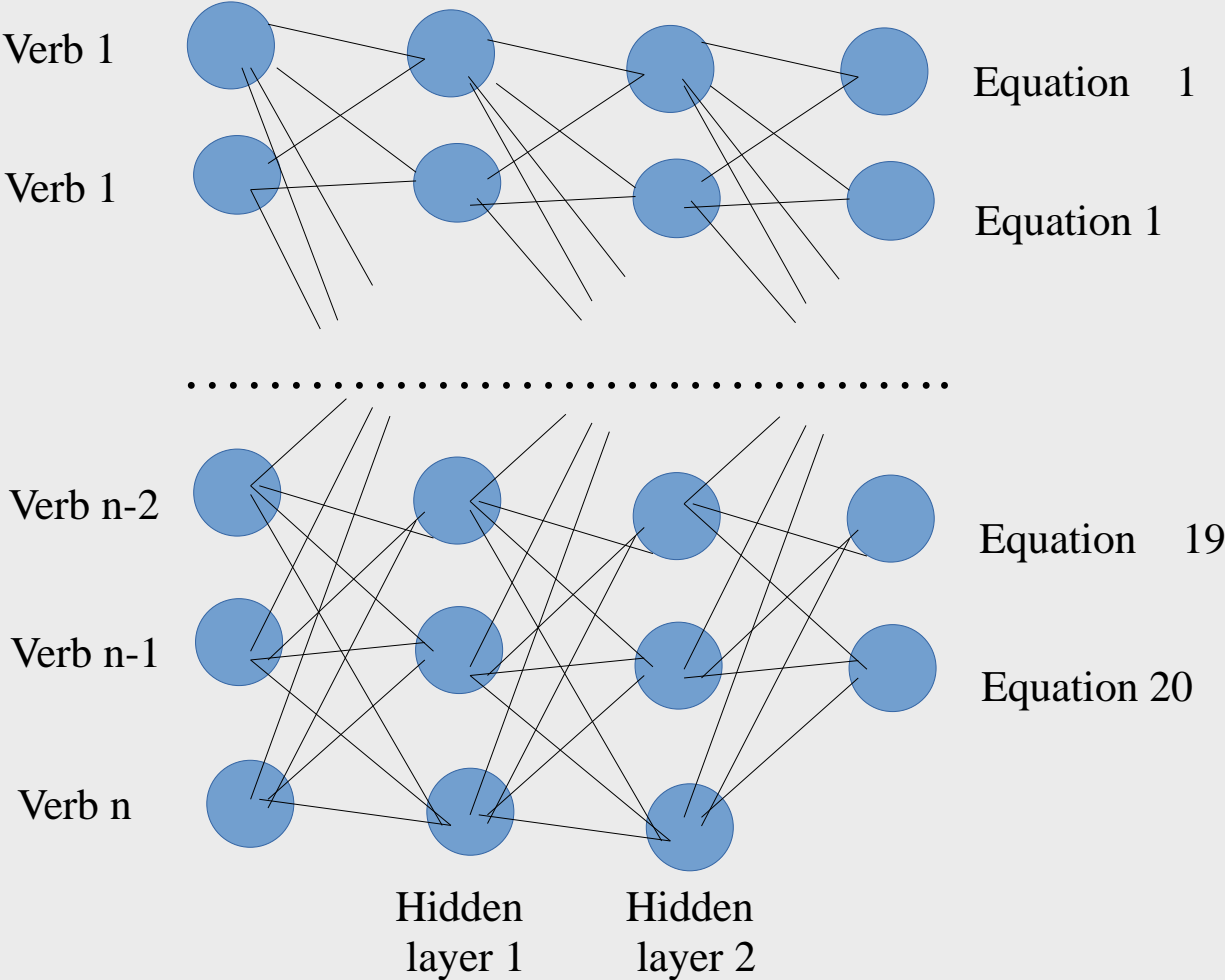
Understanding a Question

- ▶ extract digits form the question.
- ▶ substitute to the equation variables.
- ▶ obtain the answer

Server Process Blocks



Feed Forward Neural Net Classifier



Results

Ram has 4 apples. Shyam gave him 2 more. How many apples does Ram have?



Equation: $X = 4 + 2$

Answer: 6

Got Wrong Answer? Help us by clicking incorrect button!

Incorrect Answer

Results

- ❖ Simple arithmetic word based story problems
- ❖ About 13 equation class trained
- ❖ User Interface to enter problems
- ❖ Working API
- ❖ System able to train on user inputs

Limitations

- Trained on few equation classes
- Limited Dataset
- Preprocessing system
- Few categories of problem sets

Future Work

- Adaptation to varieties of problem category
- Filter system of user data to train system
- Improvement of preprocessing system
- Integration of OCR system for ease of user
- Improved API/SDK to be able to integrate with other system

Application/Business Areas

- Education Sector
- Book Publishing
- Monetization of SDK and API
- Hottest Field of AI research



Thank You

Questions + Demo

