

# Automated Answer Paper Evaluation System

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S7 CSE (2016 Batch)

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July 13, 2020

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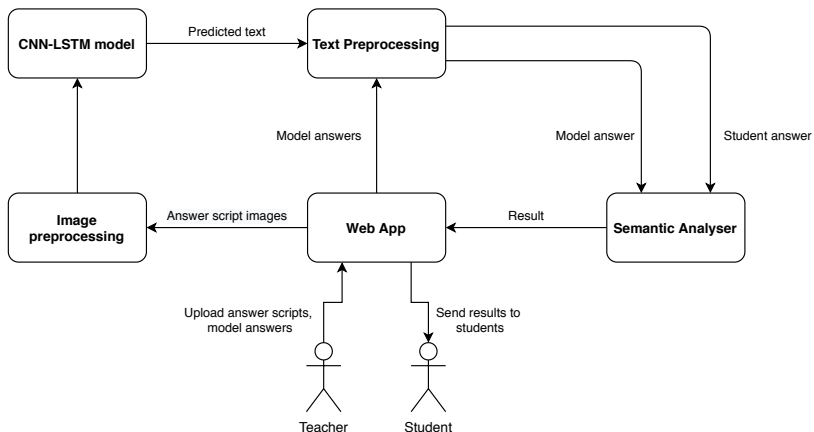
# Introduction

- A GUI for teachers and students
- A handwriting recognition system based on a CNN-LSTM architecture used for digital conversion of answer paper.
- A NLP model used for semantic evaluation of digital answer paper using provided answer key.
- Publish results to students

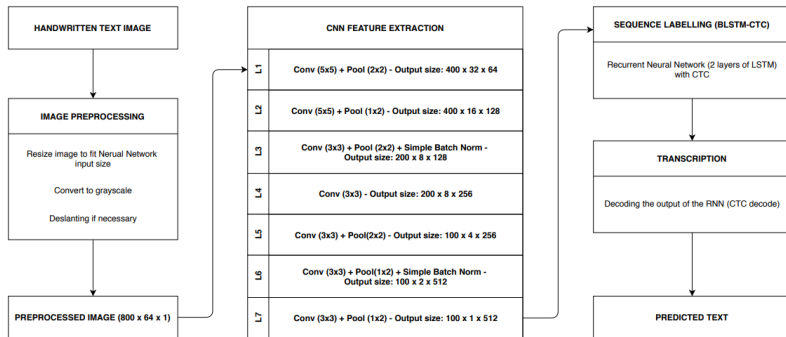
# Motivation

- Manual evaluation time consuming.
- Automated system preferred for fast evaluation.
- Manual evaluation can cause inconsistent results.
- Students need to pay extra fees for answer script copies.
- Delay of results for final year students

# System Architecture



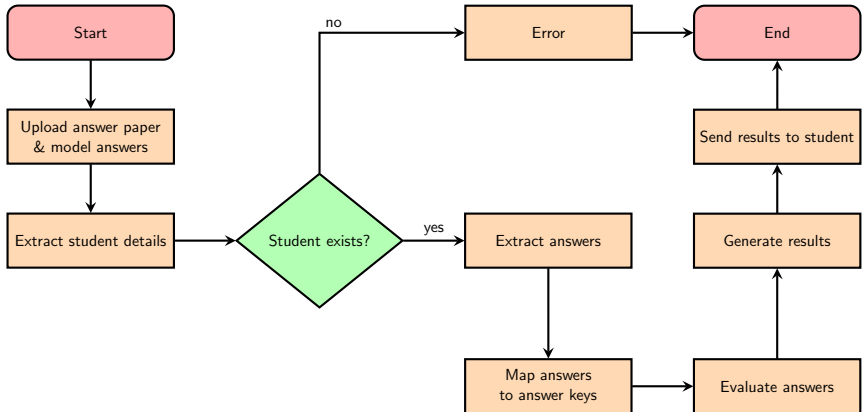
# HTR Model



# Classifier Architecture

Type	Description	Output
Input	gray-value line-image	$800 \times 64 \times 1$
Conv+Pool	kernel $5 \times 5$ , pool $2 \times 2$	$400 \times 32 \times 64$
Conv+Pool	kernel $5 \times 5$ , pool $1 \times 2$	$400 \times 16 \times 128$
Conv+Pool+BN	kernel $3 \times 3$ , pool $2 \times 2$	$200 \times 8 \times 128$
Conv	kernel $3 \times 3$	$200 \times 8 \times 256$
Conv+Pool	kernel $3 \times 3$ , pool $2 \times 2$	$100 \times 4 \times 256$
Conv+Pool+BN	kernel $3 \times 3$ , pool $1 \times 2$	$100 \times 2 \times 512$
Conv+Pool	kernel $3 \times 3$ , pool $1 \times 2$	$100 \times 1 \times 512$
Collapse	remove dimension	$100 \times 512$
Project	project onto 80 classes	$100 \times 80$
CTC	decode or loss	$\leq 100$

# Flow Chart





# Data Flow Diagram - Level 0

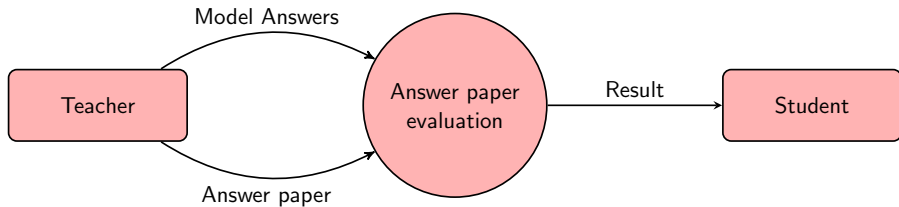
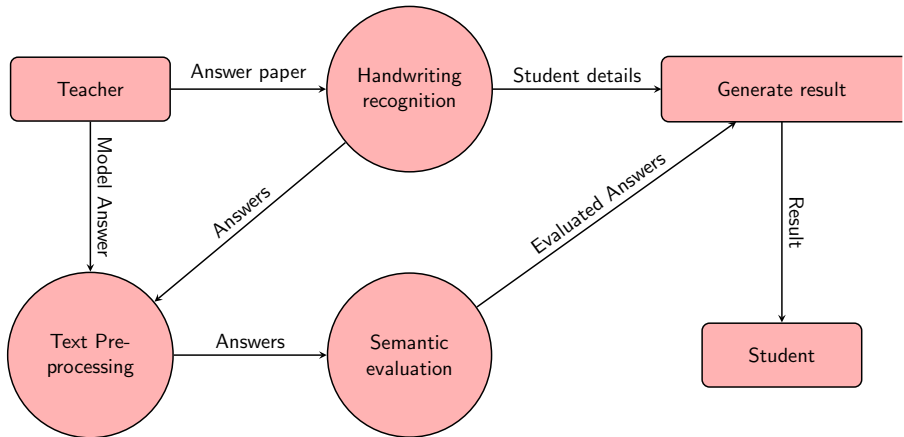
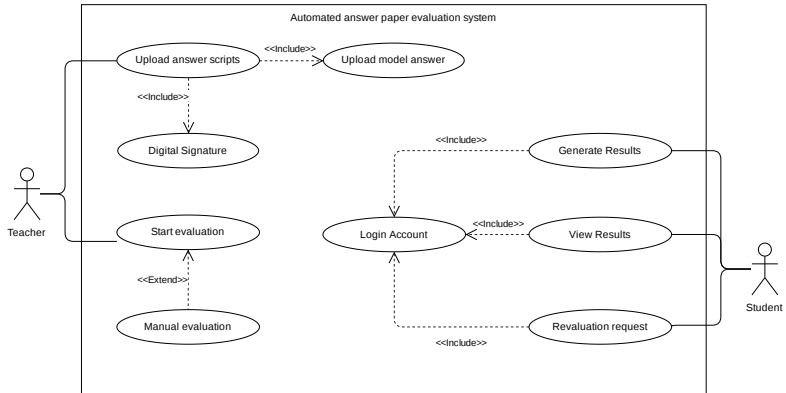


Figure: Data Flow Diagram Level 0

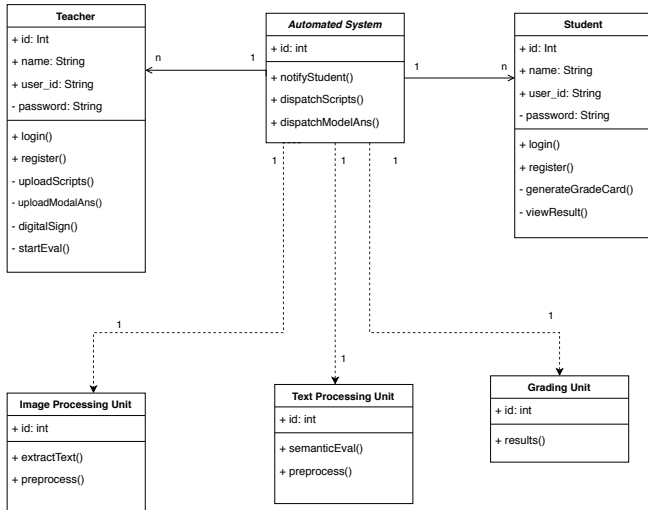
# Data Flow Diagram - Level 1



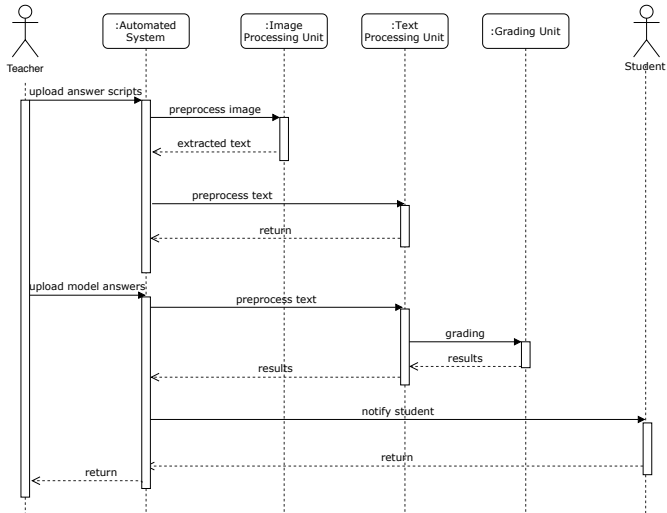
# Use Case Diagram



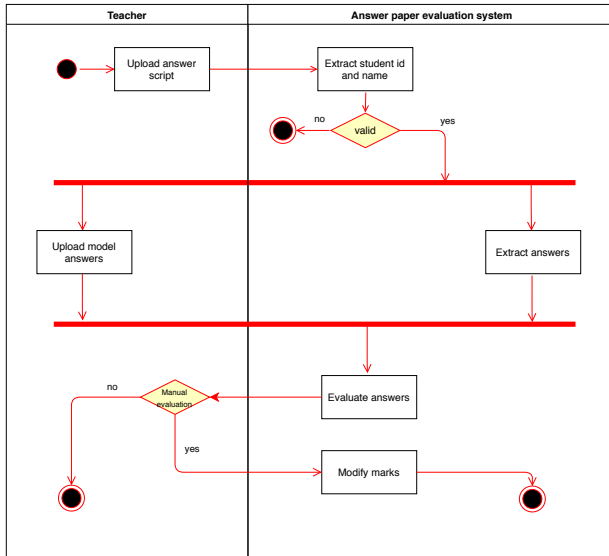
# Class Diagram



# Sequence Diagram



# Activity Diagram



# Results

**Login**

Username :

teacher@example.com

Password :

\*\*\*\*\*

Login

☒ Remember me [Cancel](#) Forgot [password?](#)

Figure: Login Page

# Results

## Evaluation system

[Home](#)[Profile](#)[Logout](#)

### File Input

 No file chosen

Supported Image are '.png', '.jpg'

Figure: Upload Page



# Results

Evaluation system

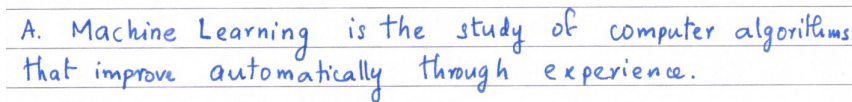
[Home](#)[Profile](#)[Logout](#)

## Result

Semantic score: 0.96

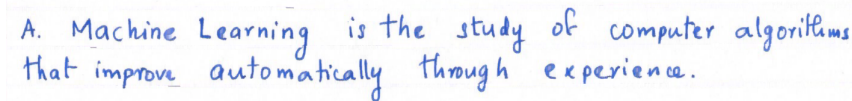
Figure: Result Page

# Results



A. Machine Learning is the study of computer algorithms that improve automatically through experience.

Figure: Input image



A. Machine Learning is the study of computer algorithms that improve automatically through experience.

Figure: Input image after horizontal lines are removed

# Results

A. Machine Learning is the study of computer algorithms that improve automatically through experience.

Figure: Input image after line segmentation

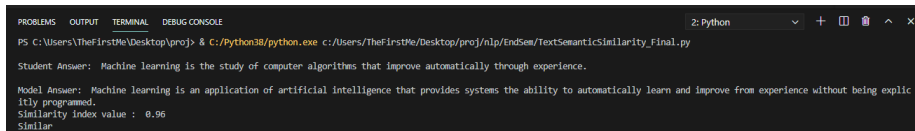
```
Init with stored values from ../model/snapshot-24
WARNING:tensorflow:From C:\Users\TheFirstMe\dev\htr\src\Model.py:47: The name tf.summary.scalar is deprecated. Please use tf.compat.v1.summary.scalar instead.
WARNING:tensorflow:From C:\Users\TheFirstMe\dev\htr\src\Model.py:48: The name tf.summary.FileWriter is deprecated. Please use tf.compat.v1.summary.FileWriter instead.
WARNING:tensorflow:From C:\Users\TheFirstMe\dev\htr\src\Model.py:50: The name tf.summary.merge is deprecated. Please use tf.compat.v1.summary.merge instead.

Without Correction:
A. Machine Learning is the study of computer algorithms
that improne automatically through experiene .

With Correction:
A. Machine Learning is the study of computer algorithms
that improve automatically through experience .
```

Figure: Prediction with and without correction

# Results



```

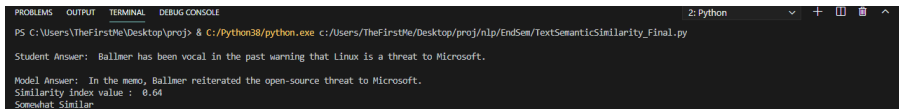
PROBLEMS  OUTPUT  TERMINAL  DEBUG CONSOLE
2: Python
PS C:\Users\TheFirstMe\Desktop\proj> & C:/Python38/python.exe c:/Users/TheFirstMe/Desktop/proj/nlp/EndSem/TextSemanticSimilarity_Final.py

Student Answer: Machine learning is the study of computer algorithms that improve automatically through experience.

Model Answer: Machine learning is an application of artificial intelligence that provides systems the ability to automatically learn and improve from experience without being explicitly programmed.
Similarity index value : 0.96
Similar

```

Figure: Semantic analysis from HTR result



```

PROBLEMS  OUTPUT  TERMINAL  DEBUG CONSOLE
2: Python
PS C:\Users\TheFirstMe\Desktop\proj> & C:/Python38/python.exe c:/Users/TheFirstMe/Desktop/proj/nlp/EndSem/TextSemanticSimilarity_Final.py

Student Answer: Ballmer has been vocal in the past warning that Linux is a threat to Microsoft.

Model Answer: In the memo, Ballmer reiterated the open-source threat to Microsoft.
Similarity index value : 0.64
Somewhat Similar

```

Figure: A false positive evaluation

# Conclusion

- We presented a method to recognize handwritten texts using a system based on CNN-LSTM model widely applied to transcribe isolated text lines.
- A GUI was provided for teachers and students.
- A CER of 8.57% was obtained.
- The WER was relatively high as seen from results.
- Semantic analysis was done on a word-word comparison.
- This lead to false postives. Need to improve this in the future.

# Thank You