On

Automated Grading System

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Introduction

- Writing essays is a key component of many curricula across most academic subjects. Unlike other forms of evaluation, such as multiple choice tests, essays allow students to demonstrate their knowledge of a given subject in greater detail.

- However, unlike multiple choice tests, essays have no clear right or wrong answers and thus, they have traditionally been graded by people, wasting valuable time.

- This is an issue for two reasons. Firstly, the lack of any feedback provided by such a system denies students the ability to learn from the mistakes they made on the essay so that they might earn a better score on their next written assignment.

- Secondly, having no feedback as to how a computer algorithm assigned an essay score could decrease both students' and teachers' trust in the legitimacy of such scores, decreasing the likelihood of fully adopting such a system.

Objectives

- To develop an "Automatic Essay Grader" website that utilizes machine learning to grade essays on a scale of 1-10 and provide comprehensive analysis.

- The platform aims to streamline the essay evaluation process by offering automated grading, text analysis, summarization, and grammar checking capabilities.

Solution Details

- **Essay Grading:** Utilizes an LSTM model trained on a large dataset, employing word embeddings and K-Fold cross-validation to achieve high accuracy.

- **Essay Analysis:** Provides word count, sentence count, unique words, and readability score using custom algorithms.

- **Summarization:** Implements extractive summarization techniques using NLP to generate concise summaries of essays.

- **Grammar Checking:** Integrates LanguageTool API to identify and highlight grammatical errors in the submitted essays.

Work Flow!
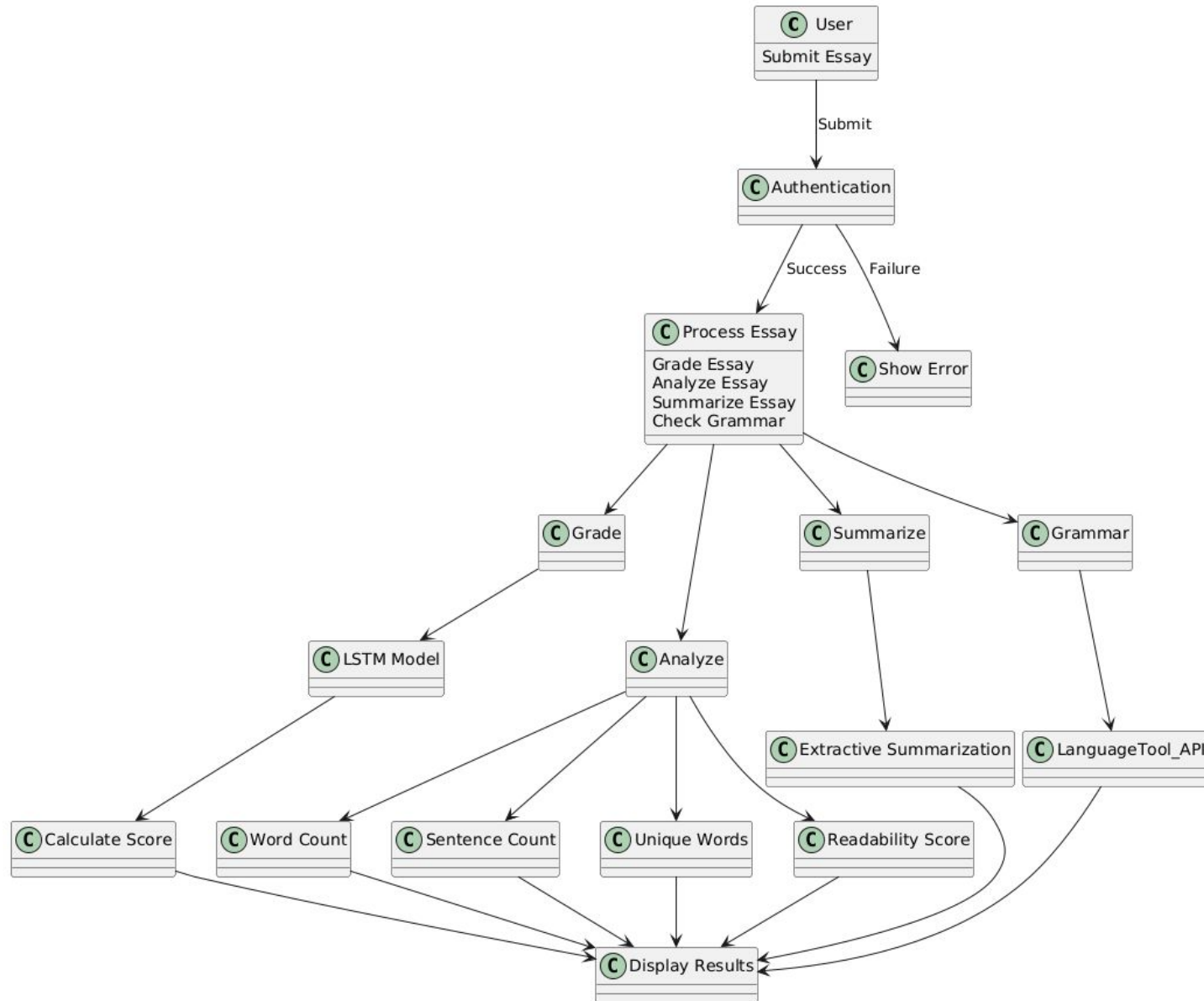
❑ **Technologies**:

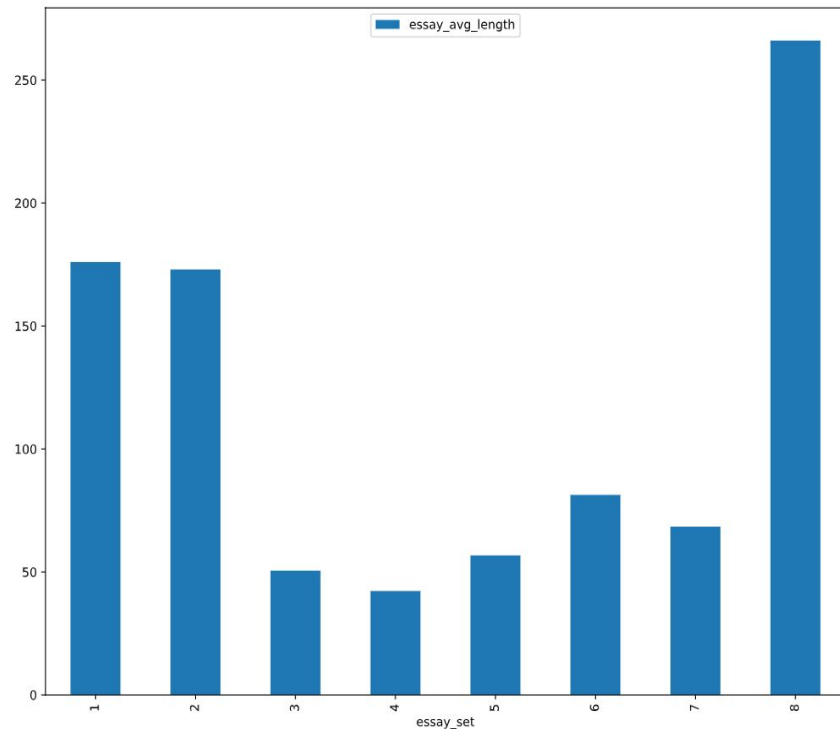- Frontend: HTML, CSS, JavaScript
- Backend: Python, Flask
- Machine Learning: TensorFlow, Keras, NLTK
- API: LanguageTool API for grammar checking

Essay Sets Description
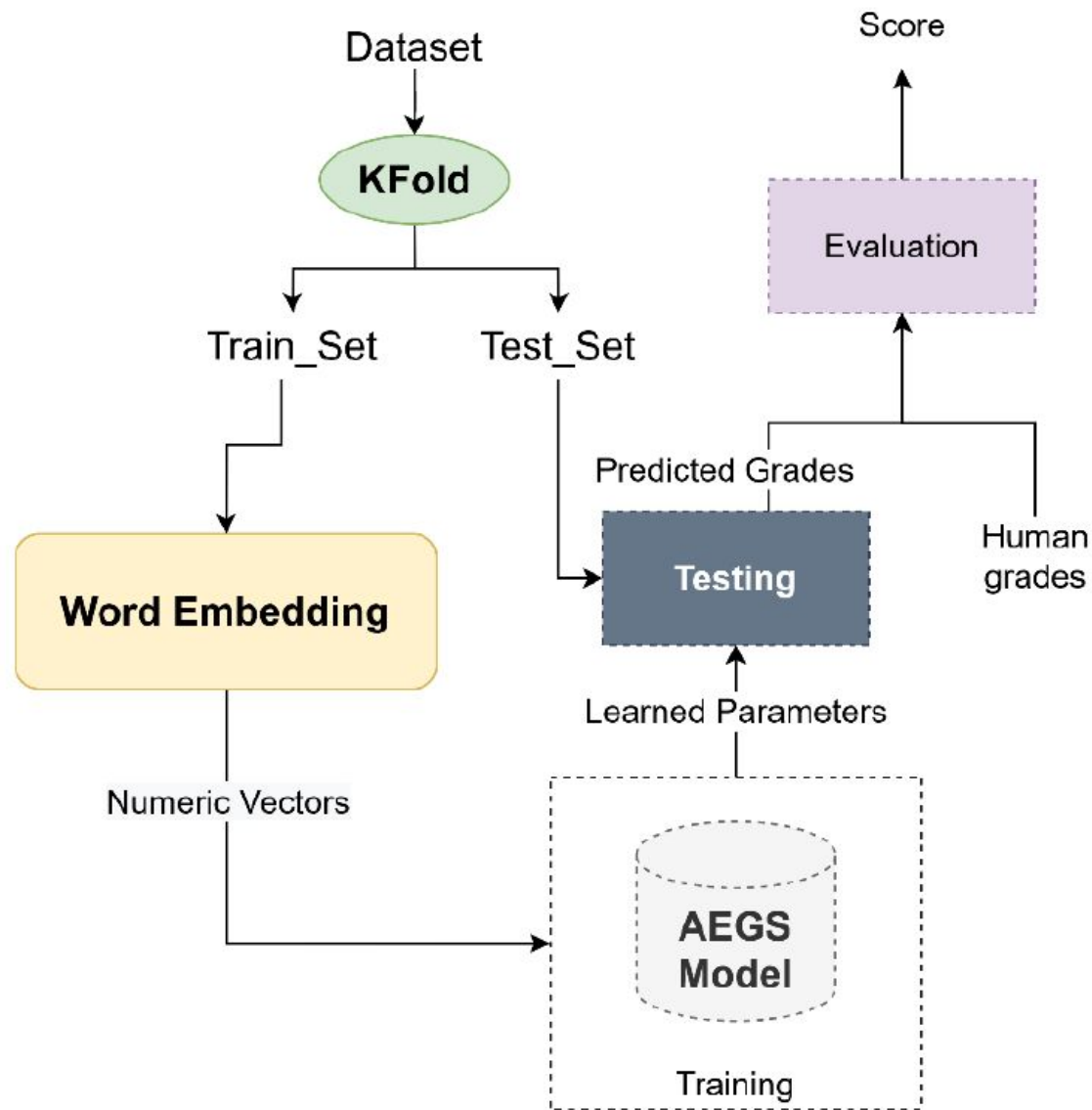
essay_set	grade_level	train_set_size	min_score	max_score
1	8	1783	2	12
2	10	1800	1	6
3	10	1726	0	3
4	10	1772	0	3
5	8	1805	0	4
6	10	1800	0	4
7	7	1569	0	30
8	10	723	0	60

Essay Average Length Of Each Set

ML model flow

Model Training

```
Total params: 814,705
Trainable params: 814,705
Non-trainable params: 0

_____
Epoch 1/10
163/163 [==============================] - 9s 19ms/step - loss: 77.3711 - mae: 5.1047
Epoch 2/10
163/163 [==============================] - 3s 21ms/step - loss: 40.9615 - mae: 3.6990
Epoch 3/10
163/163 [==============================] - 3s 20ms/step - loss: 32.6562 - mae: 3.3860
Epoch 4/10
163/163 [==============================] - 3s 20ms/step - loss: 27.0329 - mae: 2.9641
Epoch 5/10
163/163 [==============================] - 3s 19ms/step - loss: 23.4302 - mae: 2.8214
Epoch 6/10
163/163 [==============================] - 3s 19ms/step - loss: 21.6493 - mae: 2.6983
Epoch 7/10
163/163 [==============================] - 3s 20ms/step - loss: 19.9469 - mae: 2.6259
Epoch 8/10
163/163 [==============================] - 3s 21ms/step - loss: 20.3627 - mae: 2.5908
Epoch 9/10
163/163 [==============================] - 3s 21ms/step - loss: 18.3081 - mae: 2.4940
Epoch 10/10
163/163 [==============================] - 3s 20ms/step - loss: 17.1988 - mae: 2.3812
/////////////////// Start Predicting ///////////////////
Koppa Score: [ 0.9110617817942928 ]

-------------------- Fold 3 of 5 --------------------

/////////////////// Start Training ///////////////////
Model: "sequential_6"

_____
Layer (type)              Output Shape            Param #
===============================================
lstm_12 (LSTM)            (None, 1, 300)          721200

lstm_13 (LSTM)            (None, 64)              93440

dropout_6 (Dropout)       (None, 64)              0

dense_6 (Dense)           (None, 1)               65
===============================================
Total params: 814,705
Trainable params: 814,705
Non-trainable params: 0
```
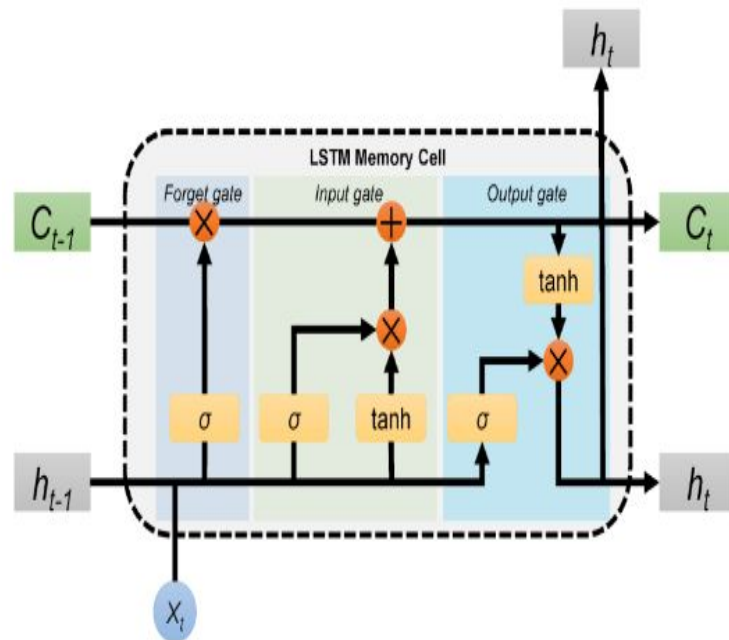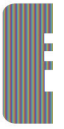
LSTM ARCHITECTURE

Layer	Output Shape	# of Parameters
LSTM Layer	(None, 1, 300)	721,200
LSTM Layer	(None, 64)	93,440
Dropout Layer	(None, 64)	0
Dense Layer (hidden layer)	(None, 1)	65

Project Highlights

ACCURACY-GRAPH

Results: Web Application
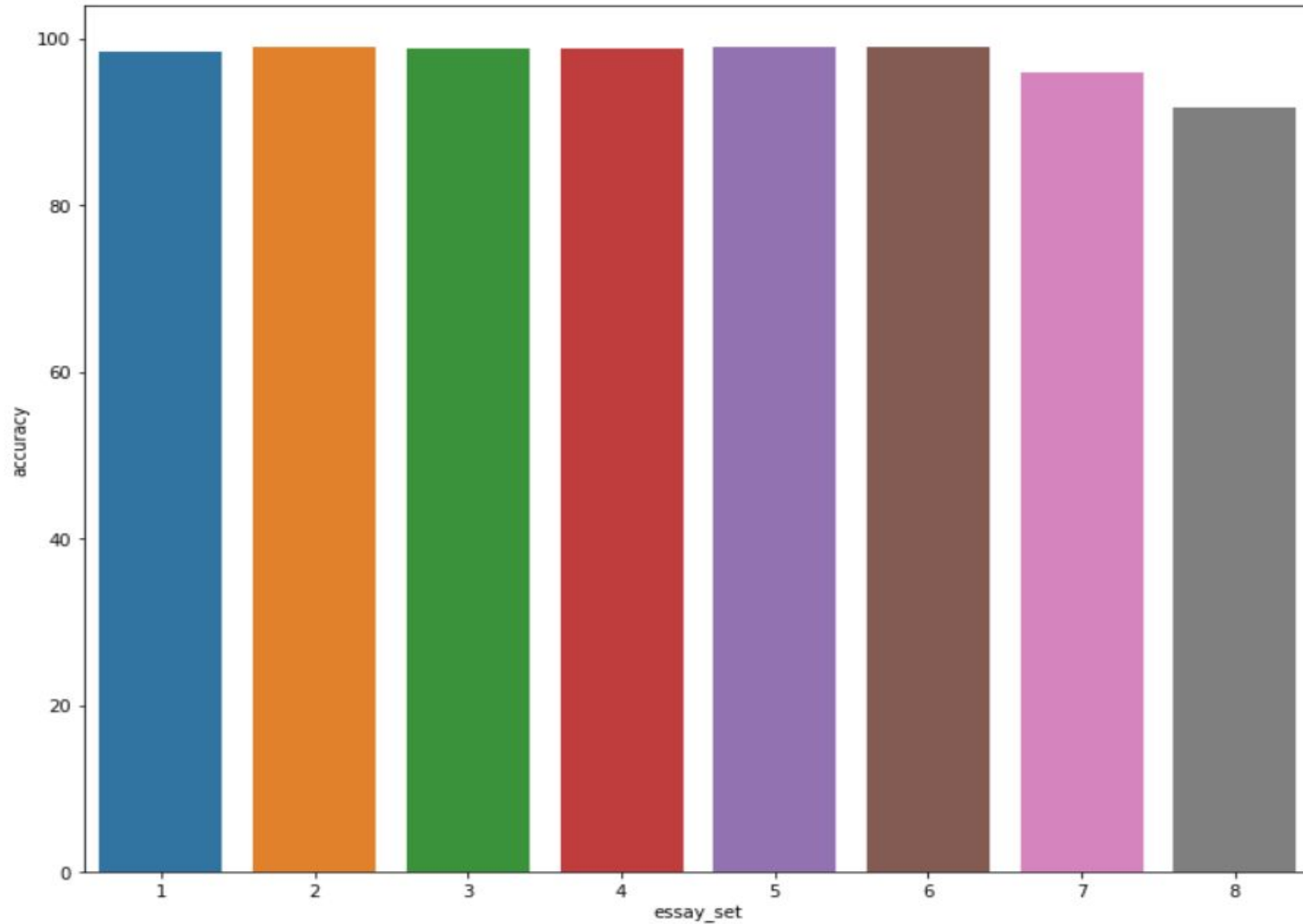
Results: Web Application

Advanced Essay Analyzer
Get comprehensive feedback, grading, and analysis on your writing

Your Essay

Why is women's empowerment important?
Women's empowerment is not just a moral imperative; it is also essential for the overall development and progress of society.
Here are some compelling reasons why women's empowerment should be a top priority:
1. Economic Growth: When women are empowered economically, they contribute significantly to their families' and communities' financial stability. Studies have shown that investing in women's economic empowerment can lead to increased productivity and GDP growth.
2. Health and Well-being: Empowered women have better access to healthcare, leading to improved maternal and child health outcomes. They are also more likely to make informed choices about their reproductive health.
3. Education: Educated women are more likely to send their children, especially daughters, to school. This creates a ripple effect of increased literacy and knowllledge within communities.

| Grade Essay | Analyze Essay | Generate Summary | Check Grammar |

Predicted Grade: 3

Grammar Suggestions:

> **Possible spelling mistake found.**
> Context: "...ripple effect of increased literacy and knowllledge within communities. 4. Political Parti..."
> Suggestion: knowledge

Essay Analysis:

Word Count: 316
Sentence Count: 24
Unique Words: 194
Readability Score: 16.77 (Very Confusing)

Essay Summary:

Key Words: women, and, a, s, empowerment
Summary: Why is women's empowerment important. Women's empowerment is not just a moral imperative; it is also essential for the overall development and progress of society. Here are some compelling reasons why women's empowerment should be a top priority: 1.

Thank You