

# Using Machine Learning for Automatic Correction of Numerical Analysis Assignments Towards Sustainable Education Development

Ohud Abdullah Bukhari , Dr. Ashwag Omar Maghraby  
Computer Science Department  
Umm Al-Qura University  
Makkah, Saudi Arabia

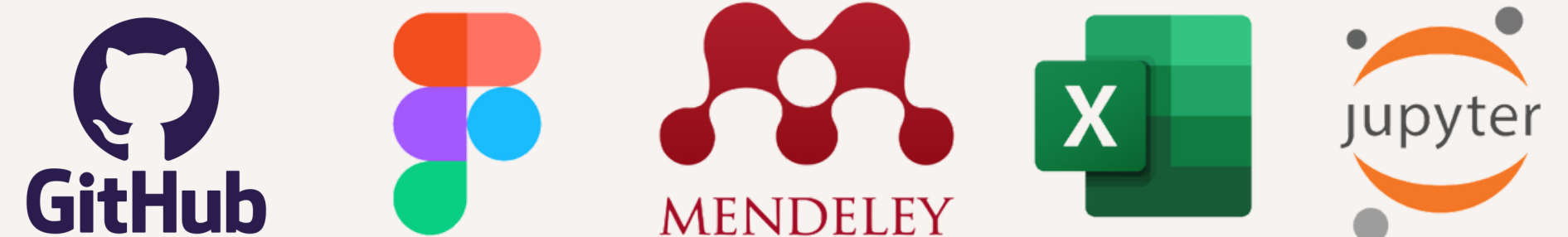
## Abstract

Education investment is the most important pillar for achieving sustainable development goals. One of the critical aspects of the educational process is student assessment, which enables teachers to address current issues in education and measure teaching effectiveness and student performance. Correcting assessments takes teachers time and effort. This research proposed a solution to this issue by automatically correcting the true percent relative error equation with less human interference by using a machine learning approach. It tried and tested six machine learning classification algorithms. The results showed that the gradient boosting classifier algorithm achieved the highest performance.

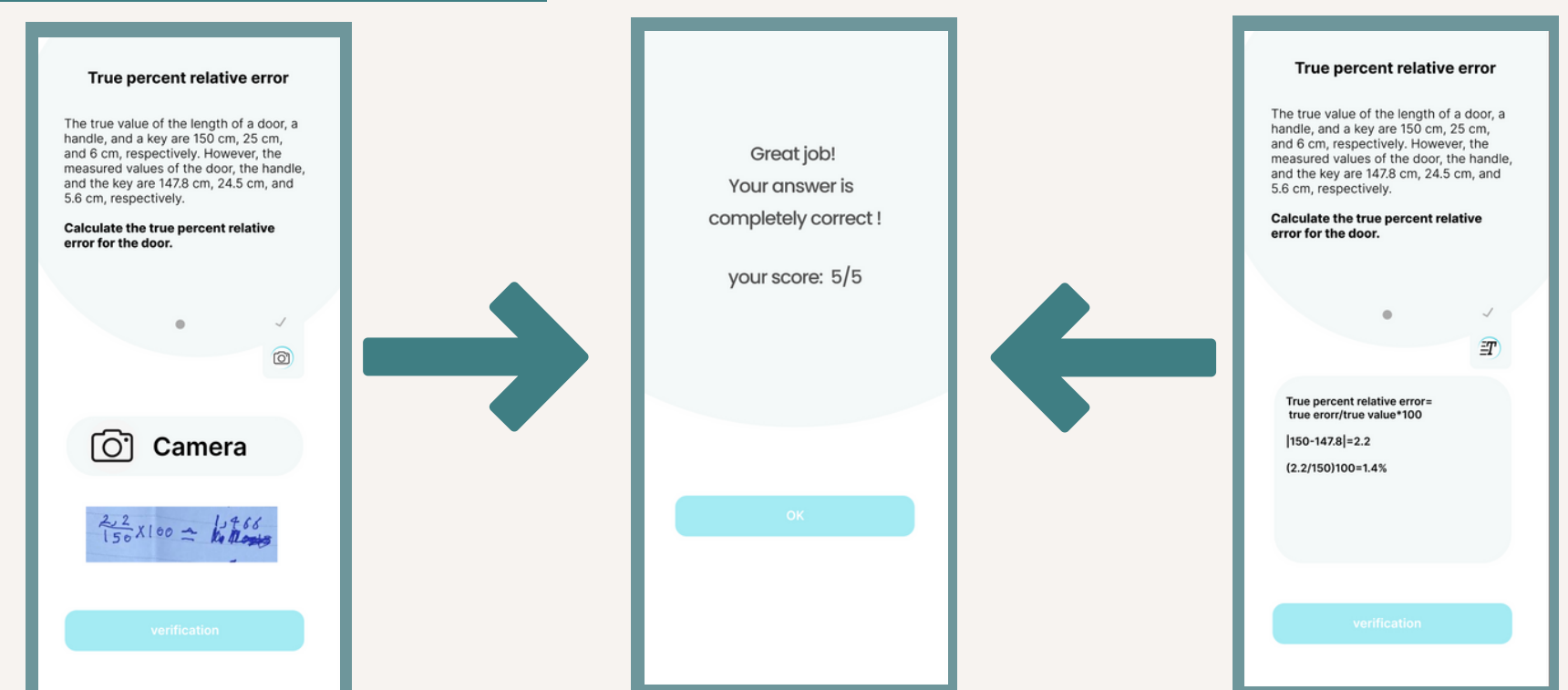
## Introduction

Education is a significant tool for change in the current era. For education to be of high quality, teachers should be skilled in developing different teaching methods. Written work assessment is one of the most common methods to test students' understanding and performance and correcting this type of assessment takes teachers time and effort. In fact, they struggle with an assessment workload that hinders them from communicating with students and addressing their needs.

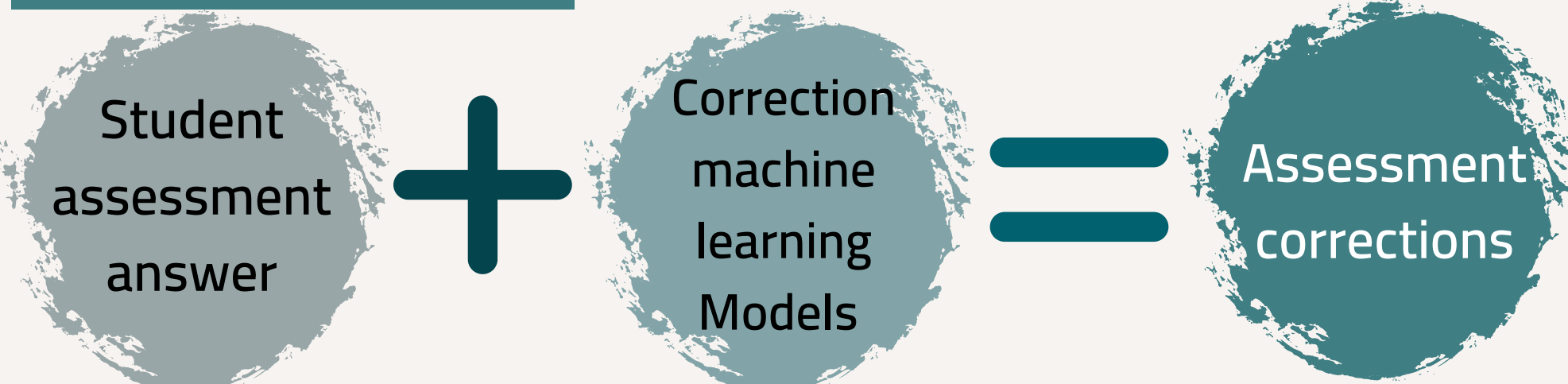
## Tools



## Prototype



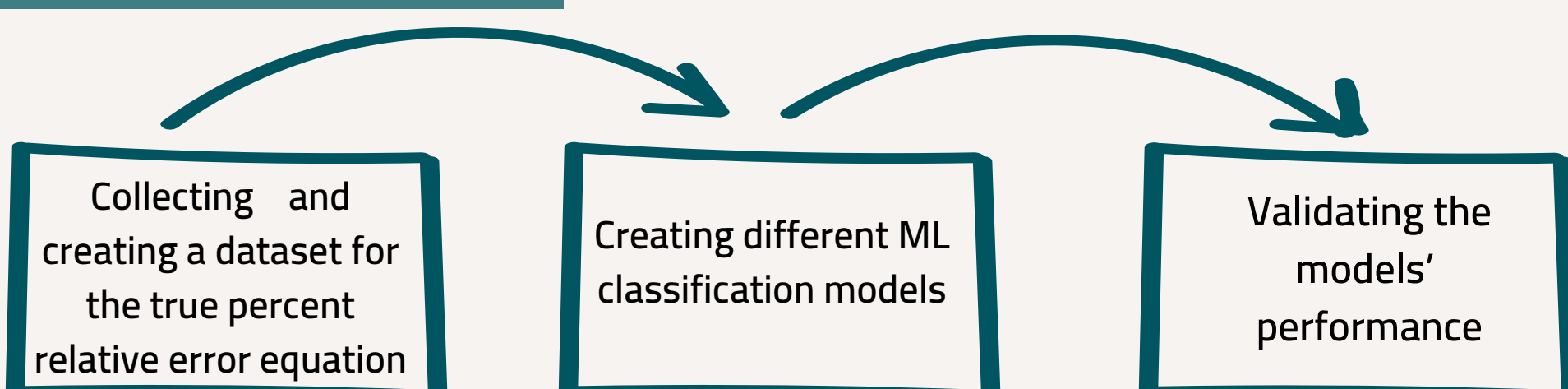
## Objective



## Result

- This research evaluated each model's performance by measuring their accuracy, precision, recall, and F1 score.
- The results showed that the gradient boosting classifier algorithm achieved the highest accuracy (86%), highest precision(87%), highest recall(86%), and highest F1 score(86%).

## Methods



## Conclusion

This research aimed to use ML algorithms in education to promote sustainable development. The goal was to help teachers automatically correct numerical analysis assessments. The best results were obtained by the gradient boosting classifier algorithm.

## Dataset

- The data were collected from numerical analysis students at Umm Al-Qura University on June 1, 2022, using Google Forms.
- Tables were then created in which data records were arranged, manually prepared, and classified.
- The dataset 550 records. It has three attributes: question, answers, and answer type.
- The answer data were divided into three types: 0 (false answer), 1 (true answer), and 2 (part of the answer is true).

## Future Work

- Extending it to correct more numerical analysis equations
- Divide the answer feature into finer type so that students can achieve fairer score.
- Increase the amount of data

## ML Models



## References



## Contact

