

Cloud-based STEM Student academic success prediction Web application.

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Background-Emerging technologies

Artificial Intelligence(AI): *Building machines that can perform tasks such as perception, reasoning, learning, and problem-solving*

Cloud computing: *"cloud" is a network of remote servers to store and access files, programs, and other digital resources on the internet instead of on your computer or device.*

Machine Learning (ML)

Making machines able to learn from data, without being explicitly programmed. Using patterns in data to make predictions.

Supervised learning- Labeled data to train a machine learning model.

Unsupervised learning- Unlabeled data to train a machine learning model.

Deep Learning- Artificial neural networks to learn from large amounts of data

Ensemble models combine two or more ML models to create more efficient and robust models.

Computer Vision

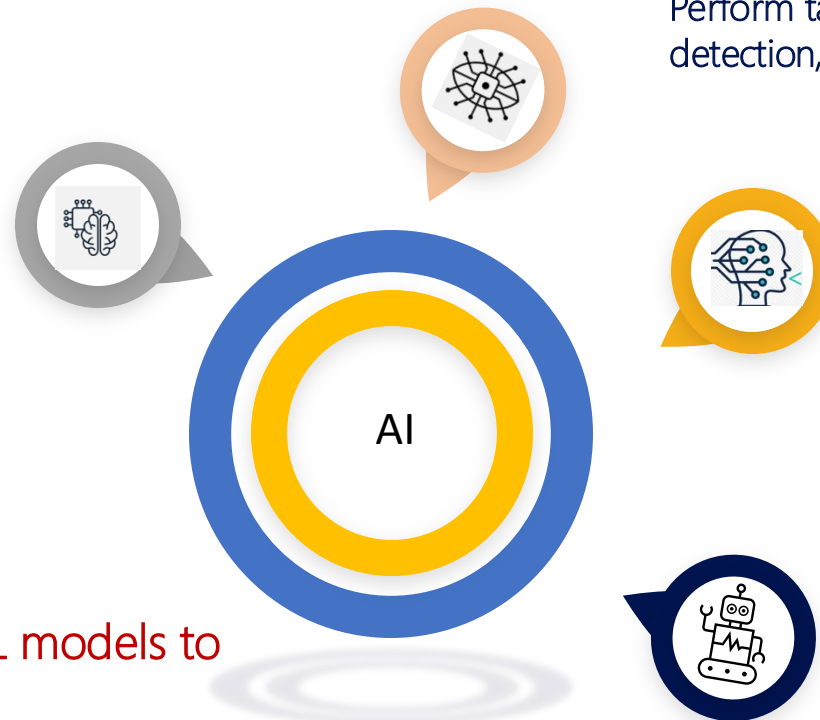
Perform tasks such as image recognition, object detection, and facial recognition.

Natural Language Processing

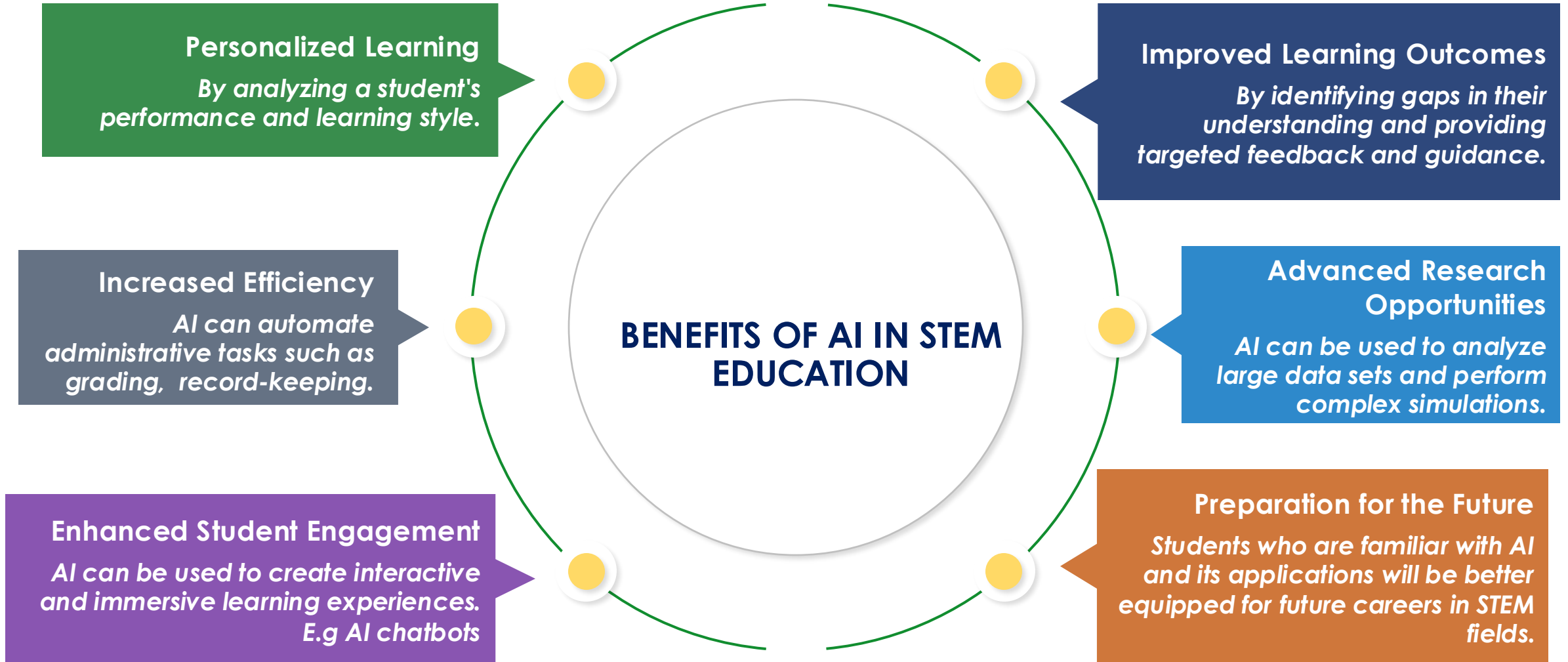
Analyze and generate text, translate languages, and extract information from unstructured data sources such as social media and email.

Robotics

Machines that can perform tasks autonomously.



Background / Literature overview



Problem Statement

There is little systematic research on building and deploying ML models for STEM education.

Barriers to AI in STEM education

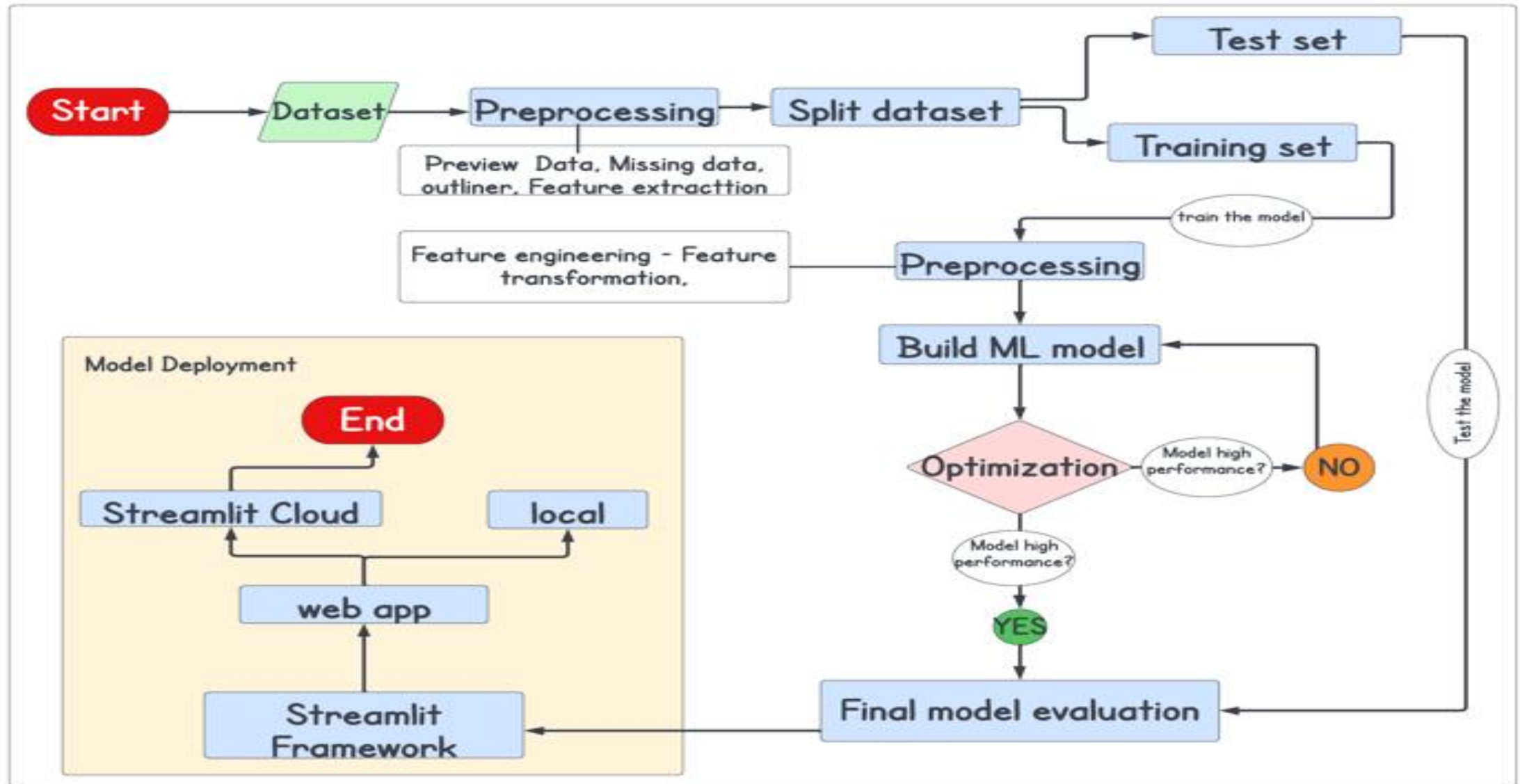
- Insufficient AI resources and support, insensitive policies,
- Teacher attitudes and beliefs.
- Insufficient technical skills.
- Ethics and privacy.
- Need for more expertise among educators regarding AI concepts.

Statement of purpose



To develop and deploy cloud-based ML web applications for easy access for educators.

Proposed ML system



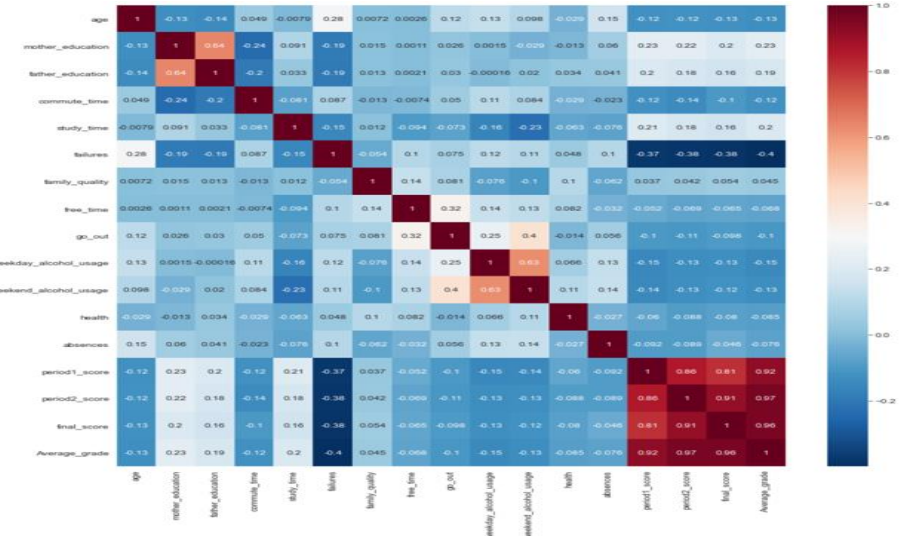
Implementation- Ensemble models

Dataset

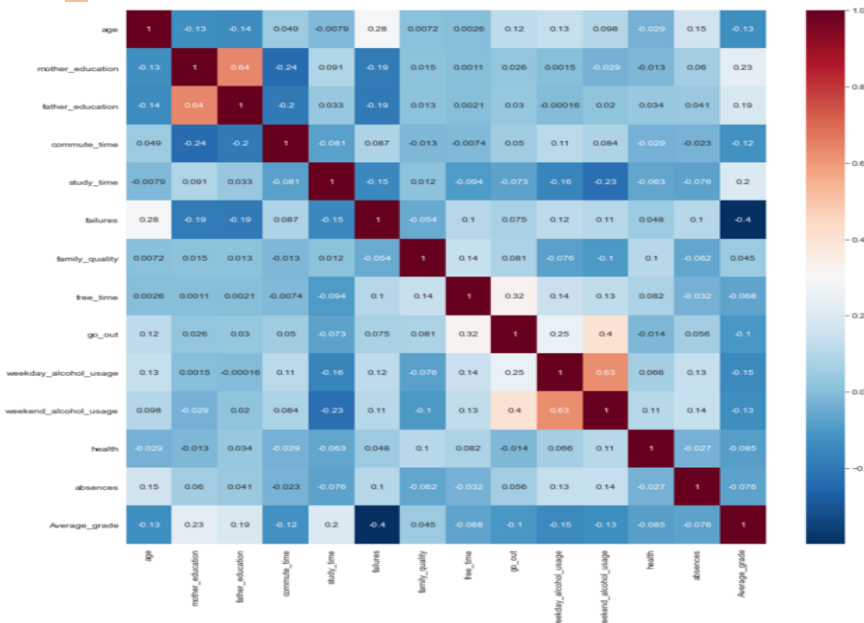
- From UC Irvine machine learning repository
- Students' academic performance at two high schools.
- 33 features and 1044 instances. The dataset contains
- Several non-numerical and categorical features.

Tools: Python, Jupyter Notebook.

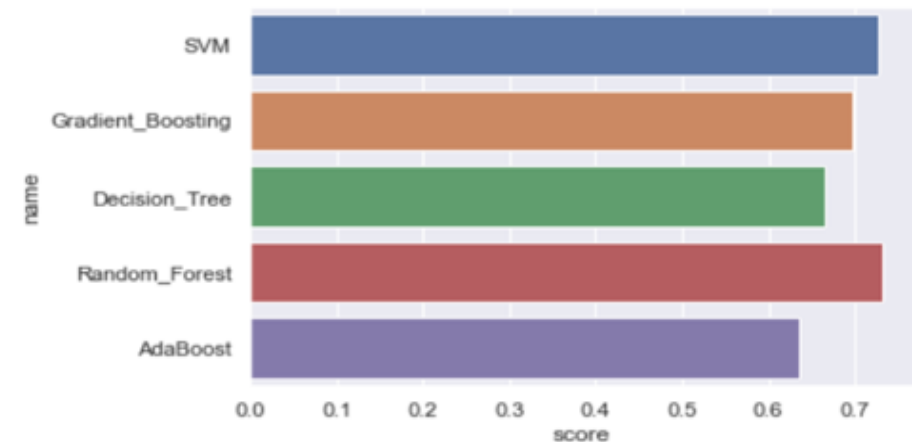
Data preprocessing



Feature engineering



Ensemble models



Implementation- ML model deployment

User Input Parameters

1. Student's age (from 15 to 22)

1522

2. Father's education? (0 = none, 1= 4th grade, 2= 5th to 9th grade, 3 = secondary education 4 = higher education)

05

3. Mother's education? (0 = none, 1= 4th grade, 2= 5th to 9th grade, 3 = secondary education 4 = higher education)

05

4. Home to school travel time? (1 = <15 min, 2 = 15 to 30 min, 3 = 30 min. to 1 hour, 4 =>1 hour)

04

5. Weekly study time? (1 = <2 hours, 2 = 2 to 5 hours, 3 = 5 to 10 hours, 4 =>10 hours)

04

6. Number of past class failures?

04

7. Extra paid classes within the course subject?

yes

8. Quality of family relationships (from 1 - very bad to 5 - excellent)

05

9. With a romantic relationship?

Student Success Prediction App

This app predicts STEM student Academic success

Choose input parameters by clicking the arrow on the Top left Corner.
This Web App will predict student academic success based on performing below or above average once the following (15) parameters are inputed.
This is based on Ensemble model - Random Forest Classifier with data from UCI Machine Learning Repository <http://archive.ics.uci.edu/ml/datasets/Student+Performance>.

User Input parameters

	age	mother_education	father_education	commute_time	study_time	failures	paid_classes	romantic	family_quality	free_time	go_out	weekday_alcohol_usage	weekend_alcohol_usage	health	absences	
0	22		4	5	0	4	0	yes	yes	5	3	3	0	0	4	4

User Input features

	age	mother_education	father_education	commute_time	study_time	failures	family_quality	free_time	go_out	weekday_alcohol_usage	weekend_alcohol_usage	health	absences	paid_classes_no	paid_clas	
0	22		4	5	0	4	0	5	3	3	0	0	4	4	0	1

Predict Student grade

0

0 Successful

Prediction Probability

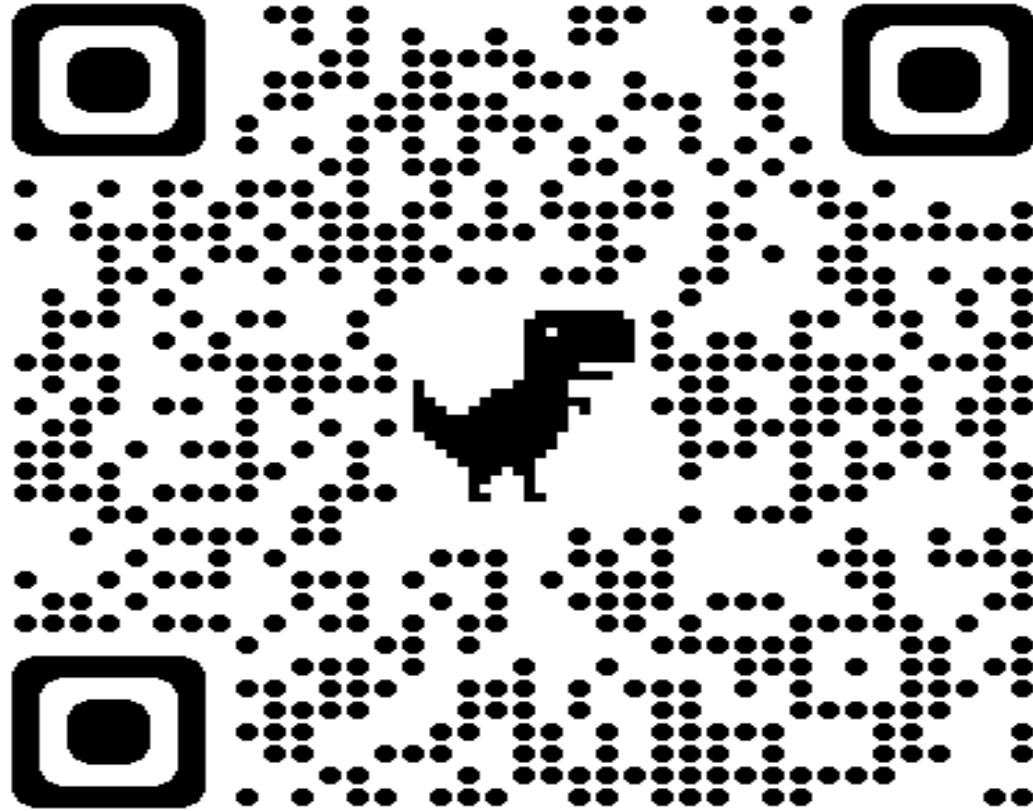
0	1
0	0.2974 0.7026

Streamlit is an open-source Python library web application framework

Deployment guide

- Top 15 features as inputs for the web application.
- A pickle file containing the ML model.
- Python file containing the streamlit framework that receives input from the user.
- A comma-separated values (CSV) file containing selected features.
- A text file containing the requirements for the ML library.

Live demo



<https://student-academic-success-prediction.streamlit.app/>

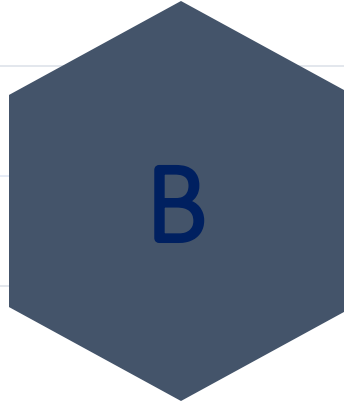
For the best experience, use a personal computer.

Significance, contribution and conclusion



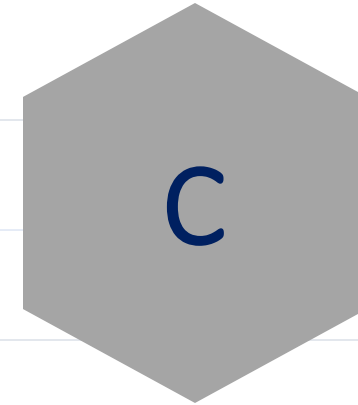
Learning experience

- Early identification of struggling students.
- Provide valuable insights into student performance and engagement.
- Personalized learning.



Data-driven decision making

- Can help increase retention and graduation rates for STEM students.
- Inform decision making around course design, teaching methods, and student support services.



Education technology policies

Improve practices and policies on AI in STEM education.

**THANK
YOU**

Contact: 

