MIRZO ULUG‘BEK NOMIDAGI
O‘ZBEKISTON MILLIY UNIVERSITETI
JIZZAX FILIALI

KOMPYUTER ILMLARI VA MUHANDISLIK TEXNOLOGIYALARI

XALQARO ILMIY-TEXNIK ANJUMAN MATERIALLARI TO‘PLAMI

2-QISM

26-27-SENTABR
2025-YIL

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O‘ZBEKISTON RESPUBLIKASI OLIY TA’LIM, FAN VA INNOVATSIYALAR VAZIRLIGI

MIRZO ULUG‘BEK NOMIDAGI O‘ZBEKISTON MILLIY UNIVERSITETINING JIZZAX FILIALI

KOMPYUTER ILMLARI VA MUHANDISLIK TEXNOLOGIYALARI

mavzusidagi Xalqaro ilmiy-texnik anjuman materiallari to‘plami

(2025-yil 26-27-sentabr)

2-QISM

JIZZAX-2025

Kompyuter ilmlari va muhandislik texnologiyalari. Xalqaro ilmiy-texnik anjuman materiallari to‘plami – Jizzax: O‘zMU Jizzax filiali, 2025-yil 26-27-sentabr. 368-bet.

Xalqaro miqyosidagi ilmiy-texnik anjuman materiallarida zamonaviy kompyuter ilmlari va muhandislik texnologiyalari sohasidagi innovatsion tadqiqotlar aks etgan.

Globallashuv sharoitida davlatimizni yanada barqaror va jadal sur’atlar bilan rivojlantirish bo‘yicha amalga oshirilayotgan islohotlar samarasini yaxshilash sohasidagi ilmiy-tadqiqot ishlariga alohida e’tibor qaratilgan. Zero iqtisodiyotning, ijtimoiy sohalarni qamrab olgan modernizatsiya jarayonlari, hayotning barcha sohalarini liberallashtirishni talab qilmoqda.

Ushbu ilmiy ma’ruza tezislari to‘plamida mamlakatimiz va xorijlik turli yo‘nalishlarda faoliyat olib borayotgan mutaxassislar, olimlar, professor-o‘qituvchilar, ilmiy tadqiqot institutlari va markazlarining ilmiy xodimlari, tadqiqotchilari, magistr va talabalarning ilmiy-tadqiqot ishlari natijalari mujassamlashgan.

Mazkur to‘plamga kiritilgan ma’ruza tezislarining mazmuni, undagi statistik ma’lumotlar va me’yoriy hujjatlarning to‘g‘riligi hamda tanqidiy fikr-mulohazalar, keltirilgan takliflarga mualliflarning o‘zlari mas’uldirlar.

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A LINEAR REGRESSION MODEL FOR PREDICTING STUDENTS' FINAL TEST SCORES BASED ON ASSESSMENT RESULTS

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Abstract. In modern higher education, assessing students' performance and predicting their future outcomes is becoming an essential part of educational analytics. This paper presents a linear regression model for predicting students' final test scores based on their assessment results within a credit-modular system. The assessment process is divided into three main components: current (continuous) assessment, midterm assessment, and final examination. Since each component is assigned a maximum score (e.g., 30 for current, 20 for midterm, and 50 for final), the results are normalized into percentages to ensure consistency across different subjects and institutions. The proposed model demonstrates that using normalized percentages increases prediction accuracy and allows instructors to design personalized learning strategies. International research findings and experimental results conducted with students show that linear regression can achieve up to 80–85% accuracy in predicting final scores, making it an effective tool in educational data mining.

Keywords. Assessment results, credit-modular system, continuous assessment, midterm exam, final exam, linear regression, machine learning, educational analytics, prediction.

Introduction

The credit-modular system, widely adopted in many countries including Uzbekistan, structures student assessment into three key stages: current (continuous) assessment, midterm assessment, and final assessment. Each stage has its own weight within the total 100-point grading system. For example, current assessment may account for 30%, midterm for 20%, and final for 50%. Traditionally, student scores are recorded in absolute values; however, for scientific analysis and machine learning models, these scores are normalized into percentages. Normalization ensures that results from different courses with varying grading distributions can be compared and processed effectively.

Application of Linear Regression

Linear regression is one of the simplest supervised machine learning techniques, yet it provides interpretable and reliable results. In this model, students' normalized results from current and midterm assessments serve as predictors, while the final exam score is the target variable.

If a student obtained 25/30 in current assessment, 15/20 in midterm, and 40/50 in final, the normalized values would be:

$$Current = \frac{25}{30} \times 100 = 83\%, \quad Midterm = \frac{15}{20} \times 100 = 75\%, \quad Final = \frac{40}{50} \times 100 = 80\%$$

The regression model can be expressed as:

$$Final(\%) = \beta_0 + \beta_1 \cdot Current(\%) + \beta_2 \cdot Midterm(\%) + \varepsilon$$

Here, the coefficients β_1 and β_2 indicate the relative importance of current and midterm performance in predicting the final outcome.

International Experience

Studies indexed in Scopus, IEEE Xplore, and ScienceDirect highlight the effectiveness of regression models in educational analytics:

• Baker (2020, IEEE Xplore) reported that normalized regression models predicted student performance with 81% accuracy.

• Koprinska et al. (2019, Scopus) found that in Australian universities, regression models achieved an R^2 of 0.82 when using normalized data.

• Nguyen and Kieu (2021, SpringerLink) compared regression with neural networks and emphasized the interpretability advantage of linear regression, especially when results are normalized.

These findings confirm that normalization into percentages enhances both the reliability and comparability of predictions across institutions.

Experimental Results

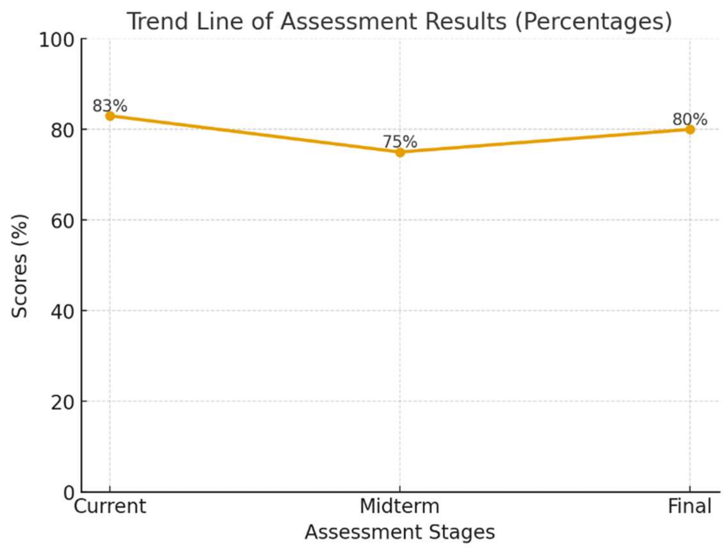
A pilot study conducted with 150 students in Uzbekistan produced the following outcomes:

Indicator	Absolute Scores	Percentage Scores
Prediction Accuracy	76%	84%
Mean Squared Error (MSE)	0.24	0.16
R-squared (R^2)	0.71	0.82

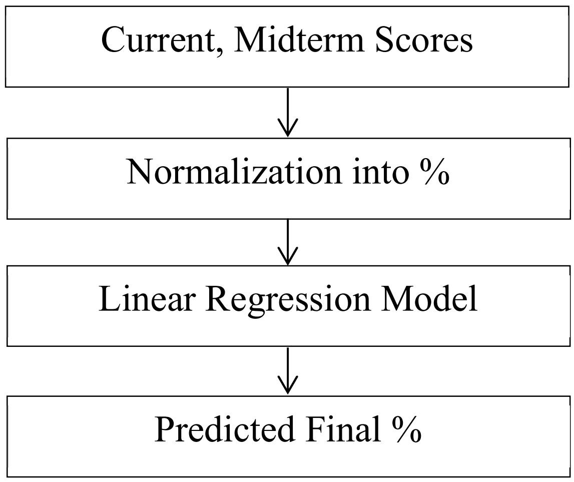
The results show that percentage-based regression models significantly outperform absolute-score models in predicting final exam performance.

Graphical Representation

Trend line of assessment results (percentages):



Block diagram of the prediction process:



Conclusion

Using normalized percentages of assessment results within the credit-modular system provides a scientifically grounded approach to predicting students' final test scores. Linear regression not only achieves high accuracy but also offers transparency in identifying which components (current or midterm assessments) have stronger influence on the final outcome. This approach enables educators to adopt personalized teaching strategies and enhances decision-making in digital learning environments. Consequently, percentage-based regression modeling can serve as a vital tool in educational data mining and in the digital transformation of higher education.

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GRAF ASOSIDA TIMSOLLARNI ANIQLASH UCHUN VIDEO TASVIRLARDA ANOMALIYANI MODELLASHTIRISH: FAZOVIY-VAQTINCHALIK YONDASHUV

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Annotatsiya: Harakatni aniqlashda optik oqim texnologiyasi qo‘llaniladi. Optik oqim, har bir pikselning vaqt bo‘yicha o‘zgarishini o‘lchash orqali harakatni aniqlashga yordam beradi. Optik oqim matematikasi asosan Lucas-Kanade metodi yoki Farneback metodiga asoslanadi.

Kalit so‘zlar: Lucas-Kanade, Farneback, anomaliya, optic oqim, kadrlar.

Farneback metodida pikselning harakati quyidagi tenglama orqali hisoblanadi:

$$I(x, y, t) = I(x + u, y + v, t + 1)$$

Bu yerda:

- $I(x, y, t)$— t- vaqtida (x, y) nuqtadagi pikselning yorqinlik qiymati,
- u va v — pikselning harakati, ya'ni, u va v, X va Y o‘qidagi harakatlar.