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# Feedback Prediction System based on CO Level

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**ABSTRACT:** This project presents a Feedback Prediction System that evaluates student performance by analyzing Course Outcome (CO)-level marks from internal exams (CIT 1 to 3) using a rule-based machine learning approach. The system takes inputs like CIT number and student roll number to retrieve CO marks (out of 25) linked to specific subject units, and classifies feedback as Excellent ( $\geq 20$ ), Good (15–19), or Need Improvement ( $< 15$ ). Each CIT covers particular COs: CIT 1 assesses CO1 and CO2, CIT 2 covers CO3 and CO4, and CIT 3 evaluates CO5. An interactive chatbot provides personalized feedback and answers student queries based on the stored data. By delivering data-driven insights, the system supports academic transparency and helps students and faculty identify strengths and weaknesses, aligning with the UN Sustainable Development Goal 4 for quality education through technology-enhanced learning.

**KEYWORDS:** Course Outcome (CO), Class Internal Test (CIT), Student Performance Prediction, Feedback Generation, Machine Learning

## I. INTRODUCTION

In today's academic environment, Outcome-Based Education (OBE) has shifted the focus toward evaluating student performance based on specific Course Outcomes (COs), which correspond to particular units or skills within a subject. This approach allows educators to gain deeper insights into students' strengths and weaknesses beyond just overall marks. However, manually analyzing CO-level results is often time-consuming, inefficient, and impractical in institutions with large student populations. Additionally, students typically receive limited or generic feedback that does not address their individual learning needs, making it difficult for them to improve in specific areas. This situation creates a clear need for an automated feedback system that can efficiently assess CO-wise marks and predict performance levels, offering timely and personalized insights that benefit both students and educators.

To address these challenges, our project introduces a Feedback Prediction System that employs rule-based logic to analyze students' internal test marks and generate targeted performance feedback. The system also features an interactive chatbot designed to simplify student interaction, answer queries, and help learners better understand their academic progress. This solution goes beyond merely automating the evaluation process—it promotes a more data-driven and transparent educational environment, making learning more student-centered and supportive. By enhancing the accuracy and accessibility of feedback, the system contributes to improving educational outcomes and aligns with modern goals for quality education.

## II. LITERATURE SURVEY

[1] R. Singh, A. Mehta, S. Rao (Springer, 2023)

This study uses machine learning models like Decision Trees and SVM to predict student performance based on internal scores and attendance. The model classifies students as “Excellent,” “Average,” or “Poor” and aids faculty in offering timely support, enhancing academic outcomes.

[2] D. Thomas, M. Shah (IEEE, 2022)

Presents a framework for mapping Course Outcomes (COs) to Program Outcomes (POs) using internal test scores. It uses weighted averages to evaluate CO attainment and supports OBE and accreditation processes.

[3]V.Raj,P.Ghosh(Elsevier,2024)

Focuses on automated feedback generation from CO-level marks using rule-based classification (Excellent, Good, Needs Improvement). It recommends smart feedback systems to help students improve weak areas.

[4]N.Desai,A.Kapoor(ACM,2023)

Introduces academic chatbots that answer student queries based on marks and COs. The chatbot uses decision-tree logic and enhances communication efficiency between students and institutions.

### III. METHODOLOGY

The Feedback Prediction System begins by accepting inputs such as the CIT number (1 to 3) and the student's roll number, then retrieves the corresponding CO-level marks from a backend database. Each CO mark, evaluated out of 25, is linked to specific subject units and categorized into performance levels—Excellent, Good, or Need Improvement—based on predefined thresholds. Using a rule-based logic, the system prioritizes CO marks relevant to each CIT exam (CIT 1: CO1 & CO2, CIT 2: CO3 & CO4, CIT 3: CO5) to automatically generate personalized feedback without manual effort. Additionally, an interactive chatbot leverages this data to respond to student queries about their academic progress and feedback, ensuring timely, transparent, and student-friendly communication throughout the learning process.

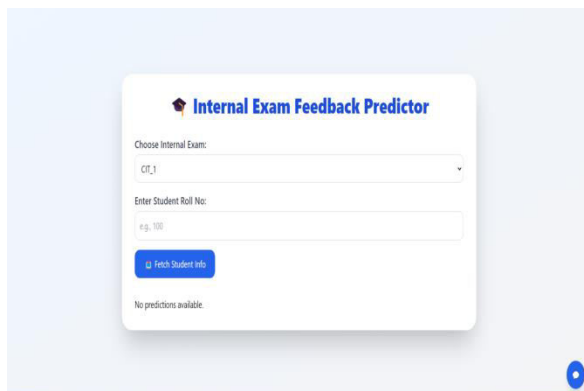
### IV. EXPERIMENTAL RESULTS

Figures illustrate the feedback prediction and visualization process using student marks and CO mapping. Figures show the step-by-step transformation of raw student data into meaningful feedback insights.

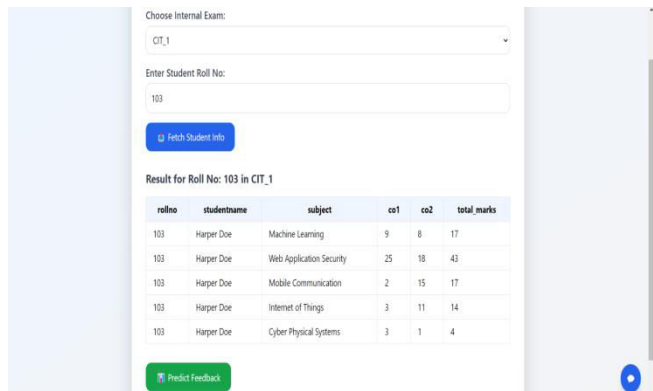
In each case:

- represents the raw student data input, which includes CIT exam marks and CO mappings.
- displays the mapped CO performance after applying the first rule-based criterion, where performance is tagged based on individual CO marks.
- shows the results after applying the second rule set, which categorizes feedback into three labels:
  - Excellent: CO marks  $\geq 20$
  - Good: CO marks between 15–20
  - Needs Improvement: CO marks  $< 15$
- shows the chatbot-assisted feedback interface, which delivers personalized comments based on the predicted result.

To reduce ambiguity in feedback and make it easier to interpret, a rule-based feedback classifier was used in combination with a performance mask generated from CO data.



(a)



rollno	studentname	subject	co1	co2	total_marks
103	Harper Doe	Machine Learning	9	8	17
103	Harper Doe	Web Application Security	25	18	43
103	Harper Doe	Mobile Communication	2	15	17
103	Harper Doe	Internet of Things	3	11	14
103	Harper Doe	Cyber Physical Systems	3	1	4

(b)



**Predict Feedback**

Predicted Feedback for Roll No: 103 in CIT\_1

rollno	studentname	subject	co1	co2	total_marks	Predicted Feedback
103	Harper Doe	Machine Learning	9	8	17	Needs Improvement in CO1, Needs Improvement in CO2
103	Harper Doe	Web Application Security	25	18	43	Excellent in CO1, Good in CO2
103	Harper Doe	Mobile Communication	2	15	17	Needs Improvement in CO1, Needs Improvement in CO2
103	Harper Doe	Internet of Things	3	11	14	Needs Improvement in CO1, Needs Improvement in CO2
103	Harper Doe	Cyber Physical Systems	3	1	4	Needs Improvement in CO1, Needs Improvement in CO2

(c)

**Ask Me Anything!**

give the student name and rollno who take 0 in CIT2

studentname	rollno
Mason Martin	102
John Miller	103
John Miller	103
Emily Martin	104
Nina Davis	107
Nina Davis	107
Tom Thomas	109
Logan Jackson	111
Ava Rodriguez	113

Type your question... **Send**

(d)

#### Feedback Prediction and Assistance:

- (a) Raw student marks & CO data
- (b) CO Performance Mapping
- (c) Feedback Categorization
- (d) Chatbot response based on feedback

#### V. CONCLUSION

We have developed an automatic Feedback Prediction System that effectively analyzes CO-level marks from internal tests and generates personalized performance feedback. Our system accurately maps marks to subject units and applies rule-based logic to provide timely, data-driven insights. The integrated chatbot further enhances student interaction by addressing their queries about academic progress. Testing on sample data shows the system reliably supports both students and educators in identifying strengths and areas for improvement.

#### REFERENCES

- [1] J. Wang and Y. Yu, "Machine learning approach to student performance prediction of online learning," PLOS ONE, vol. 20, no. 1, pp. e0299018, Jan. 2025.
- [2] F. Ouyang, M. Wu, L. Zheng, L. Zhang, and P. Jiao, "Integration of artificial intelligence, performance prediction, and learning analytics to improve student learning in online engineering course," International Journal of Educational Technology in Higher Education, vol. 20, no. 4, pp. 1–18, 2023.
- [3] F. A. Orji and J. Vassileva, "Machine Learning Approach for Predicting Students Academic Performance and Study Strategies based on their Motivation," arXiv preprint arXiv:2210.08186, Oct. 2022.
- [4] E. Kochmar, D. D. Vu, R. Belfer, V. Gupta, I. V. Serban, and J. Pineau, "Automated Personalized Feedback Improves Learning Gains in an Intelligent Tutoring System," arXiv preprint arXiv:2005.02431, May 2020.
- [5] Z. Iqbal, J. Qadir, A. N. Mian, and F. Kamiran, "Machine Learning Based Student Grade Prediction: A Case Study," arXiv preprint arXiv:1708.08744, Aug. 2017.
- [6] B.-H. Kim, E. Vizitei, and V. Ganapathi, "GritNet: Student Performance Prediction with Deep Learning," arXiv preprint arXiv:1804.07405, Apr. 2018.
- [7] M. Ramaswami and R. Bhaskaran, "A Study on Feature Selection Techniques in Educational Data Mining," Journal of Computing, vol. 1, no. 1, pp. 7–11, 2009.
- [8] A. Al-Barrak and M. Al-Razgan, "Predicting Students Final GPA Using Decision Trees: A Case Study," International Journal of Information and Education Technology, vol. 6, no. 7, pp. 528–533, 2016.

- [9] A. Dutt, N. Ismail, and T. Herawan, "A Systematic Review on **Educational Data Mining**," IEEE Access, vol. 5, pp. 15991–16005, 2017.
- [10] V. M. Aragani, "The Future of Automation: Integrating AI and Quality Assurance for Unparalleled Performance," International Journal of Innovations in Applied Sciences & Engineering, vol. 10, no. S1, pp. 19-27, 2024.
- [11] A. Romero, C. Ventura, M. Delgado, and S. García, "**Predicting Students' Final Performance** from **Participation in Online Discussion Forums**," Computers & Education, vol. 68, pp. 458–472, 2013.



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