**PROJECT NAME: Lecture-based University Preparation Application (LUPA)**

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| Questions to identify measurements: |
| 1-How effectively does the Long-Short Term Memory algorithm incorporate student data over time in the supervised machine learning model?  2-How detailed is course information, including content, evaluation criteria, and instructor feedback, provided to students?  3- How will you track the percentage of newly enrolled students benefiting from academic advising services during the course selection process?  4-How well does LUPA adapt to changing academic requirements and trends?  5-How effective is the Q&A platform in facilitating student questions and guidance from seniors?  6-How accurately does the system verify user roles, considering the different roles such as student, advisor, and administrator?  7- How effectively does the system ensure data privacy, keeping user information invisible to administrators?  8- How personalized are the recommendations for reading materials and online articles, considering varying difficulty levels?  9- How secure is the login process with two-factor authentication and CAPTCHA verification for users?  10- How quickly is the statistical course success distribution information delivered to users, aiming for less than 5 seconds? |
| Identified measurements: |
| 1-The ratio between actual values ​​and the model's predictions regarding different distribution type of course success rate.  2-Extent and clarity of course information provided to users.  3- Academic performance data and students feedback that collected from users.  4- Tracking how frequently LUPA undergoes updates or additions to accommodate evolving academic requirements and trends. It reflects the platform's responsiveness to changes in the educational landscape.  5- The effectiveness of a Q&A platform for student-senior interaction can be measured by activity metrics, response time, quality ratings, user engagement, and satisfaction surveys.  6- System will check users university account for verification and if warning message is given administrator will check the source.  7- The effectiveness of a system in ensuring data privacy can be measured by security audits, data breach incidents, and user perception surveys.  8- Determining LUPA's effectiveness in reading material and online article suggestions to individual users, considering their skill levels and preferences. It measures the degree of personalization in recommending resources that match users' proficiency levels and provide appropriate challenges or support.  9- The effectiveness of a login process with 2FA and CAPTCHA can be measured by login success rate, brute-force attempts, 2FA adoption, phishing incidents, and user security awareness.  10- This measurement focuses on how fast the system responds to the actions of the users. The timestamp of each request and the relevant user details, such as user ID or IP address will be recorded. |
| Measurement storage and collection: |
| 1-We will use our own custom metric to evaluate the results of the model that predicts which grade will be received from which course with a certain probability. This metric will basically be similar to mean squared error because even going from one grade class to another one like AA to BA can be of vital importance for students. The additional feature of our custom metric is that the probability factor will also be included in the measurement by multiplying the MSE result with the given probability. If the result distribution of a course shows excessive accumulation between certain values, at this point we will prefer the metric called F-1 score and observe the balance between precision and recall. Because at this point, it is important to know the under-represented classes and not to miss a prediction about the highly accumulated class.  2-It will be calculated regarding monthly survey results. To understand the effectiveness, the survey data will be normalized and converted into a numerical scale from 0 to 1. This scale will show the degree of success in providing clear and understandable course information, with 0 indicating poor coverage and clarity (0-0.4), 1 signifying excellent coverage and clarity (0.7-1), and anything in between as not bad (0.4-0.7).  3-Student satisfaction with application and its effectiveness in easing skill development can be assessed through various methods. Surveys will measure student opinions regarding the usefulness of the provided materials. Additionally, tracking online engagement with recommended resources will provide insight into their utilization. Pre- and post-assessments will measure the impact on students' learning outcomes. Communication with both students and instructors will offer further perspectives on the effectiveness of the materials. Ongoing analysis of student progress and online behavior over time will contribute to understanding the sustained impact. By systematically examining these metrics, adjustments can be made to optimize the quality of the provided information for all stakeholders.  4- The process of measuring how well LUPA adapts to changing academic requirements involves systematic data gathering, organization, and analysis. Robust mechanisms track alterations in academic requisites and emerging trends. Collected data is stored in a structured DBMS for efficient retrieval, ensuring alignment with current academic developments. Version control systems preserve historical data for trend analysis, while metadata standards facilitate annotation and retrieval. Data quality assurance measures ensure accuracy and reliability, with security safeguards protecting against unauthorized access. Backup and disaster recovery procedures ensure data continuity, enabling LUPA to effectively support students' educational needs amidst academic changes.  5- Measuring a Q&A platform's effectiveness involves capturing data. Store information on questions, answers, and views in a database. Timestamps for questions and answers will help calculate response times. Upvoting allows measuring answer quality. Track user logins and website activity for engagement. Finally, conduct surveys to gauge user satisfaction. This multi-pronged approach provides a clear picture of how well the platform facilitates student-senior interaction.  6-Students will register with their university accounts. The system automatically will check the roles of users to verification. If user inputs incorrect information, the warning system will promptly notify them with a warning message. If this error occurs repeatedly, the system will take the necessary action to block the user’s account.  7-Lupa, our university mobile application, prioritizes data privacy by employing AES (Advanced Encryption Standard) encryption to safeguard sensitive information from unauthorized access. Strong access controls limit administrator access, ensuring that only authorized personnel can view user data when necessary. Regular security checks and updates are conducted to fortify protection against potential risks, maintaining user confidentiality and trust. This commitment to strict data security measures ensures that LUPA remains a reliable platform for students, faculty, and staff, fostering a secure and trusted environment for all users.  8- To measure how personalized LUPA's recommendations for reading materials and online articles are, considering different difficulty levels, we systematically track and organize user interactions and preferences within the platform. We collect user feedback, proficiency levels, and stated preferences about reading materials, storing this information in a structured database for easy access. By regularly updating this data, LUPA ensures that its recommendation algorithms stay up-to-date and responsive to users' changing needs. We also keep track of how users' preferences evolve over time, allowing us to analyze trends and patterns. This thorough approach helps LUPA tailor its recommendations effectively, making sure users get the most suitable suggestions based on their proficiency levels and preferences, ultimately enhancing their learning experience.  9- Measuring the effectiveness of a login process with 2FA and CAPTCHA involves monitoring various data points. Log all login attempts (success or failure) with timestamps and IP addresses to calculate success rates and identify brute-force attacks. Track user adoption of 2FA to gauge overall security posture. Create a system for users to report phishing attempts and analyze the details. Finally, conduct surveys or quizzes to assess user awareness of secure login practices. By collecting and analyzing this data, you can identify weaknesses and improve the overall security of your login system.  10- The system will calculate the response time for delivering the success distribution data. Then use it for the calculation of the intended response time vs actual system response time. These values will be stored securely in the designated database for further use. The results will be normalized and the rescaled again with the range of 0-1. The response times within the wanted range of under 5 seconds will be assigned score of 1. Performance Metrics will calculate to evaluate the effectiveness of the system, and some performance metrics will be used, such as average response time (average time taken for the system to respond), maximum response time (longest time taken for the system to respond), and response time distribution (analyzed distribution of response times). And with these values, it will be taken into consideration if there are any patterns that require attention. |

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| Measurement  Type | Description | Example  Measurements |
| Quantitative | Numerical data representing percentage or count of the students score and calculated system prediction. | Student’s score vs system’s prediction. |
| Survey | Feedback and ratings from users. | 9 out of 10 found it's accurate. |
| Quantitative | Numerical data representing percentage or count of the students score and calculated system prediction. | 90% of newly enrolled students benefited from the LUPA application. |
| Online Tracking | The administrators will monitor the process of adaptation. | Once a every semester a system evaluation of adaptation will be done. |
| Quantitative | Counts the volume of activity on the platform. | Number of unique users viewing questions per day. |
| Qualitative | Administrator will check the user’s role. | It will be checked by administrator when a warning message is received. |
| Online Tracking | Number and type of data breaches involving unauthorized access to user information. | Zero data breaches reported in the past year (ideal but strive for low numbers). |
| Qualitative | The feedback will be taken from the users regarding to satisfaction of recommended materials. | The majority was content with recommendations. |
| Online Tracking | Ratio of successful login attempts to total attempts. | 98% successful login rate (indicates good security) |
| Quantitative | Performance Metric will be calculated with some performance values if it’s in the wanted range it will be 1. | 1: the response time was in the intended range. |