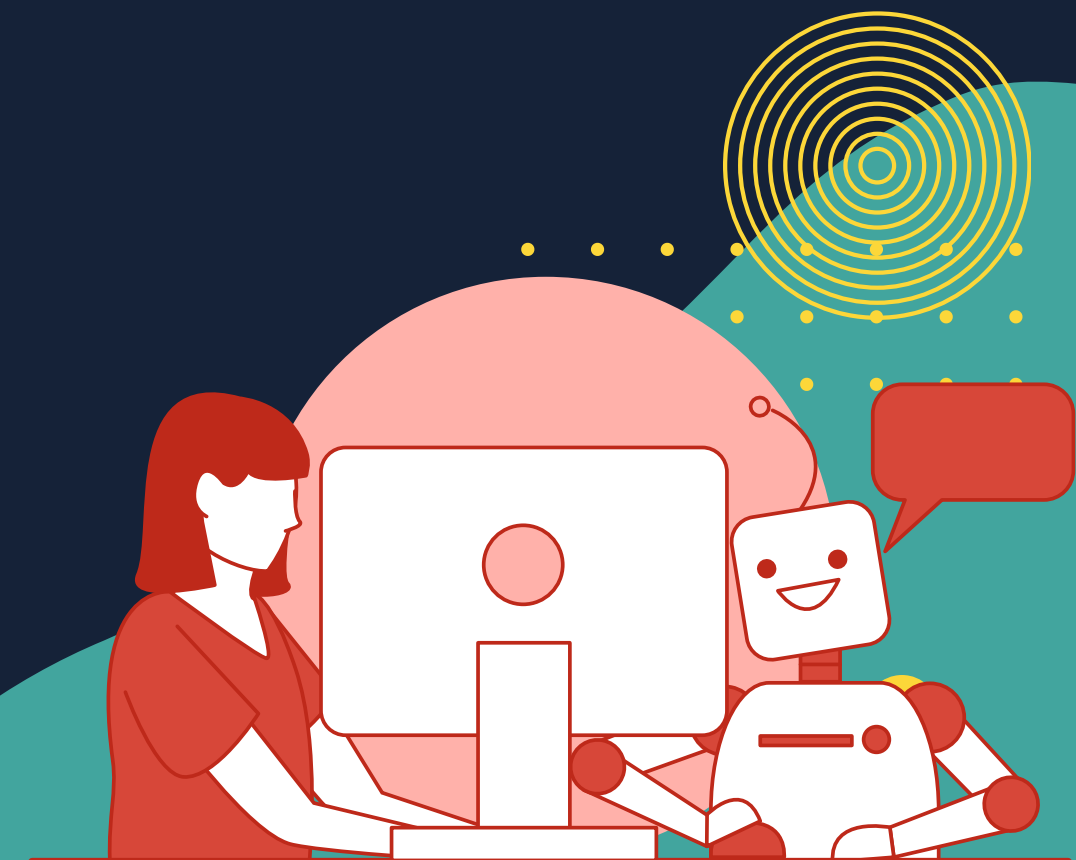


# AI-POWERED PERSONAL TUTOR:

## A Scalable, Adaptive Learning System for Enhanced Student Engagement

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**CHRIST(DEEMED TO BE UNIVERSITY)**

PROBLEM STATEMENT: 3



# PROBLEM STATEMENT

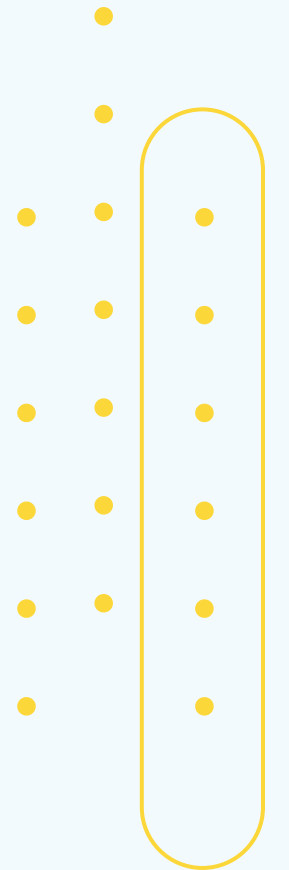
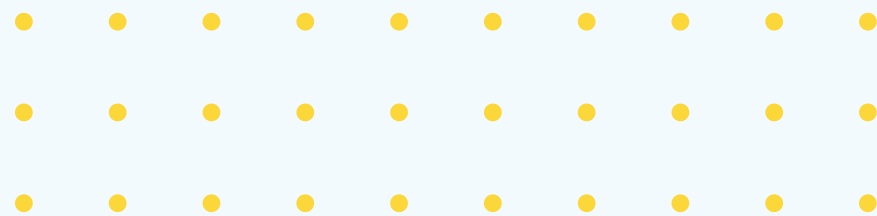
**THIS PROJECT ADDRESSES FOUR KEY CHALLENGES:**

- **Prediction of Assessment Scores:** Accurately forecasting student performance by analyzing academic and behavioral factors to decide promotion readiness.
- **Selective Content Filtering:** Identifying and omitting unnecessary topics for each learner level to avoid overload and personalize learning.
- **Recommendation of Teaching Material:** Matching content difficulty to a student's level to ensure relevance and engagement.
- **Dynamic Content Curation:** Leveraging LLMs and Retrieval-Augmented Generation (RAG) to generate adaptive and level-appropriate learning content in real time.

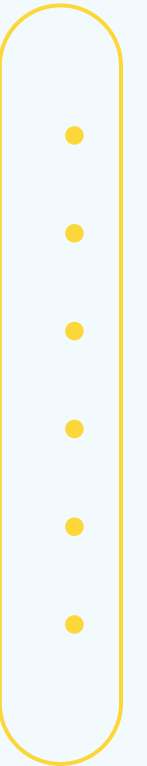


# TASK-1 STUDENT PROMOTION PREDICTION

- Built a Random Forest Classifier model achieving 96% accuracy in predicting whether students should be promoted or retained.
- Tuned hyperparameters for optimal performance and handled class imbalance via techniques like SMOTE.



# TASK 2 &3 STUDENT CLUSTERING &PREDICTING SUITABLE COURSE/MATERIAL



## **TASK 2 – STUDENT CLUSTERING:**

- Performed K-Means Clustering to group students based on learning patterns, engagement, and assessment scores.
- Used Elbow Method and Silhouette Score for optimal cluster determination.

## **TASK 3 – PREDICTING SUITABLE COURSE/MATERIAL:**

- Applied PCA (Principal Component Analysis) for dimensionality reduction and visualization of student segments.
- Used the clusters to map and suggest appropriate personalized content, ensuring each student received tailored resources based on their proficiency level.

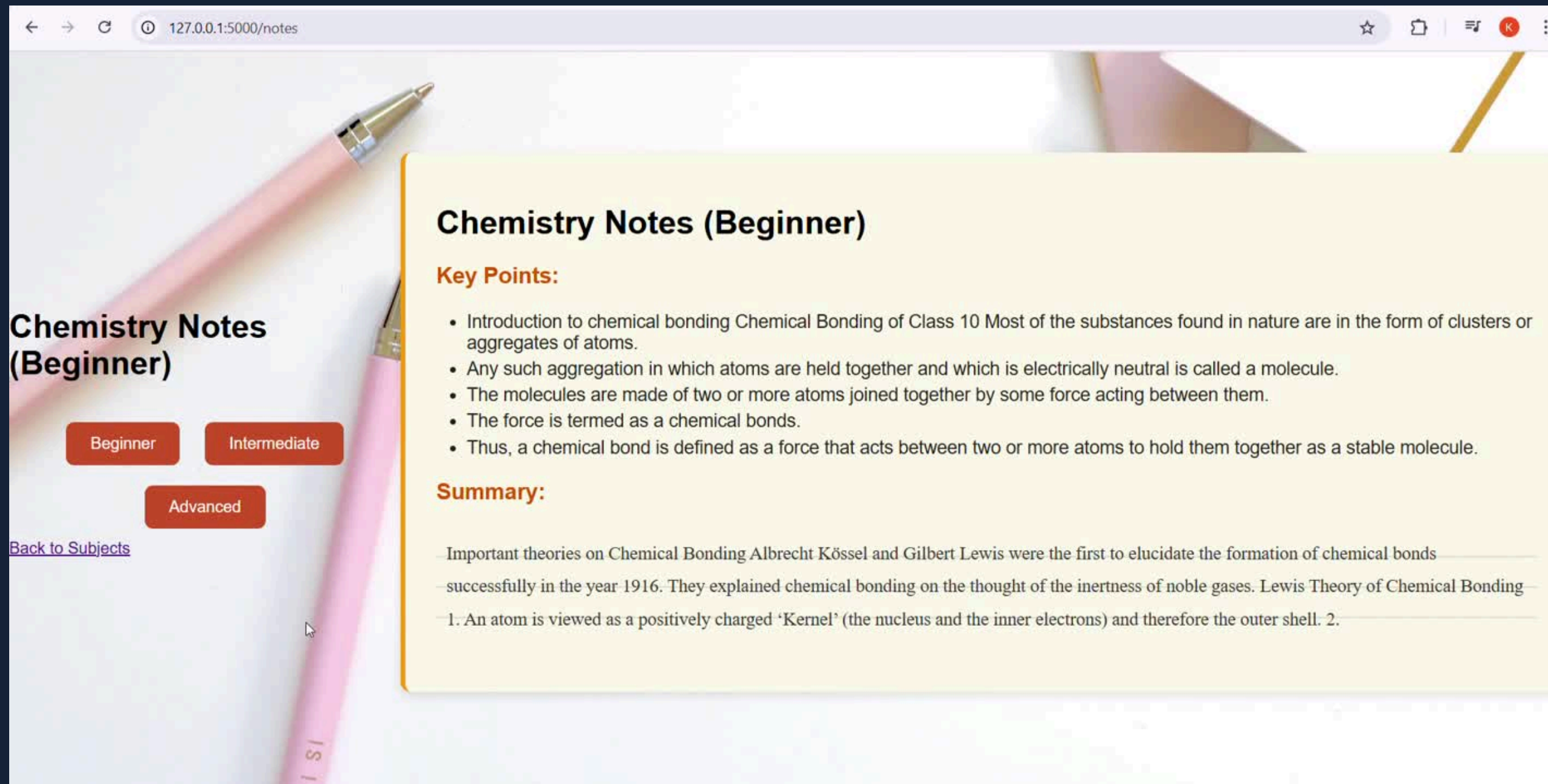


# TASK- 4 CURATING TEACHING MATERIAL DYNAMICALLY (RAG + LLM)

- **STUDENT ACTIVITY** (e.g., new test/subject), using input metrics like IQ, score, and learning level.
- Query formulated in natural language using student metadata to guide personalized content generation.
- **RAG pipeline** retrieves top educational snippets from sources like NCERT.
- **LLM (e.g., GPT)** generates level-appropriate content (simple explanations, analogies, visuals, questions).
- **CONTENT MAPPED TO STUDENT LEVEL:** Beginner, Intermediate, Advanced with difficulty scaling (Easy to Hard).
- **INBUILT DICTIONARY:** This tool allows the students to double-click any challenging term within the carefully curated content and see its definition immediately through a pop-up.



# TASK- 4 INTEGRATED WITH UI



# SUMMARY

## Task 1: Student Promotion Prediction

- Used Random Forest Classifier to predict student promotion with 96% accuracy.
- Input features included assessment scores, participation, IQ, and course level.

## Task 2: Intelligent Content Skipping

- Predicted which topics a student could skip based on past performance and engagement.
- Ensured time-efficient learning without compromising concept mastery.

## Task 3: Next Topic Prediction

- Applied K-Means Clustering + PCA to group students and predict the next suitable topic.
- Enabled personalized learning paths and optimized concept flow.

## Task 4: Dynamic Teaching Material Curation

- Leveraged RAG + LLM to create real-time, level-appropriate content.
- Delivered content tailored to student IQ, age, and test scores using semantic search and generation.



# CONCLUSION

The AI-Powered Personalized Tutor System for K-12 students is an all-inclusive and intelligent solution that meets the varied learning requirements of students of different ages and academic standards. Through the use of advanced machine learning models, retrieval-augmented generation (RAG), and large language models (LLMs), the system is able to efficiently automate four crucial tasks — forecasting student promotion, adjusting content difficulty according to the levels of the students, suggesting appropriate course material, and dynamically creating teaching content for improved understanding.





THANKYOU!

