EDUCATIONAL DATA MINING

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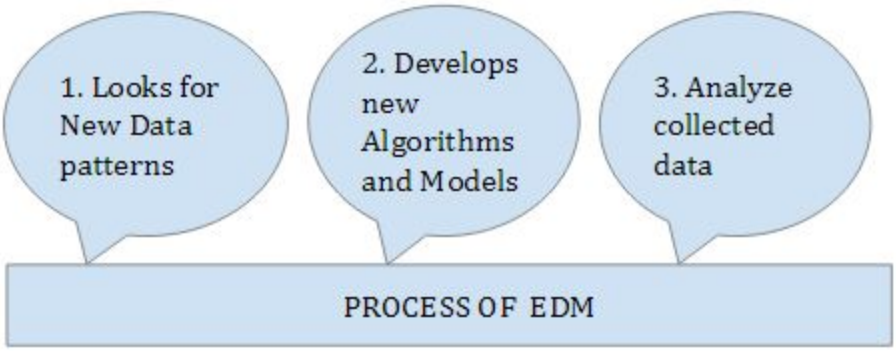
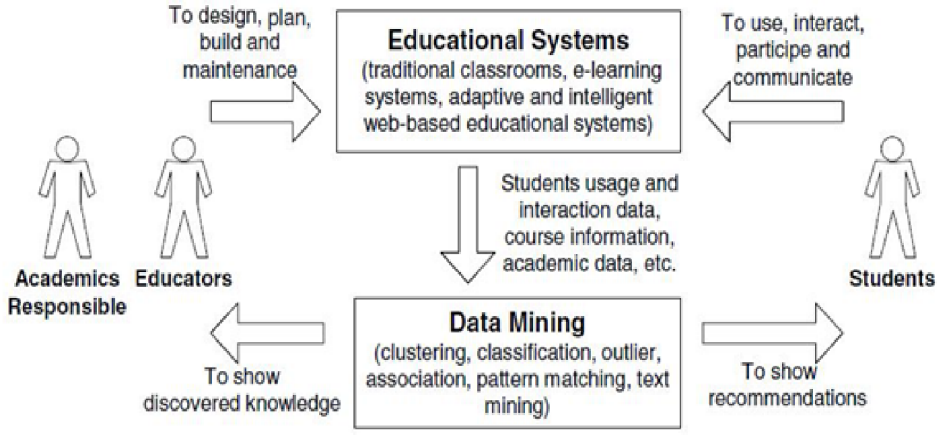
WHAT IS EDM?



WHY DO WE NEED EDM?

- Assumption of Patterns and Prediction.
- Pattern in data -> Predict what comes next -> Relevant action
- As students work, the system captures their inputs (activities, knowledge, strategy)
- Adaptive learning environments - Online learning systems that use data to change in response to student performance.
- Students benefit from detailed learning data
- Education community benefits from an interconnected feedback system.



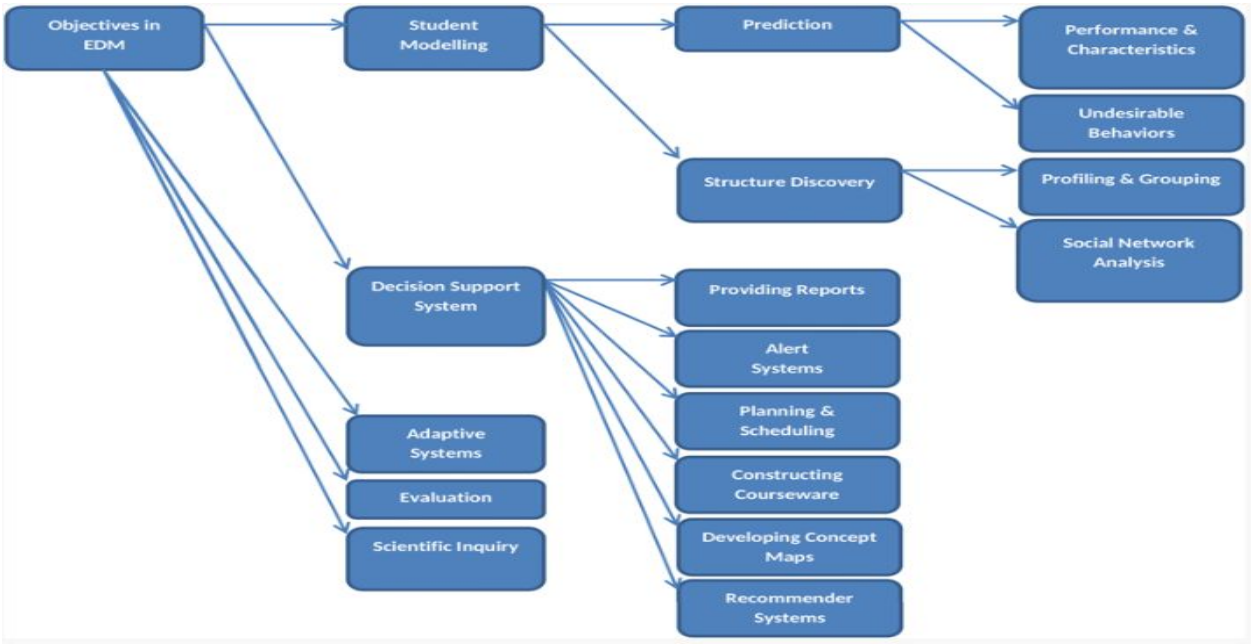
DATA MINING METHODS - SUPERMARKET SCENARIO:

1. **Anomaly Detection:** Identification of interesting data. **Eg:** Customer's habits of purchasing
2. **Association Rule Learning**: Searches for relationships between variables. **Eg:** Which products are frequently bought together
3. **Clustering:** Discovering groups in similar data. **Eg:** Seasonal produce/ Organic Fruits
4. **Classification**: Generalizing known structure to apply to new data. **Eg:** Which produce are stored in Freezer
5. **Regression**: Finding a function which models the data to represent the structure.
6. **Summarization:** Compact representation of the data set. **Eg:** Using this Info for Marketing purposes

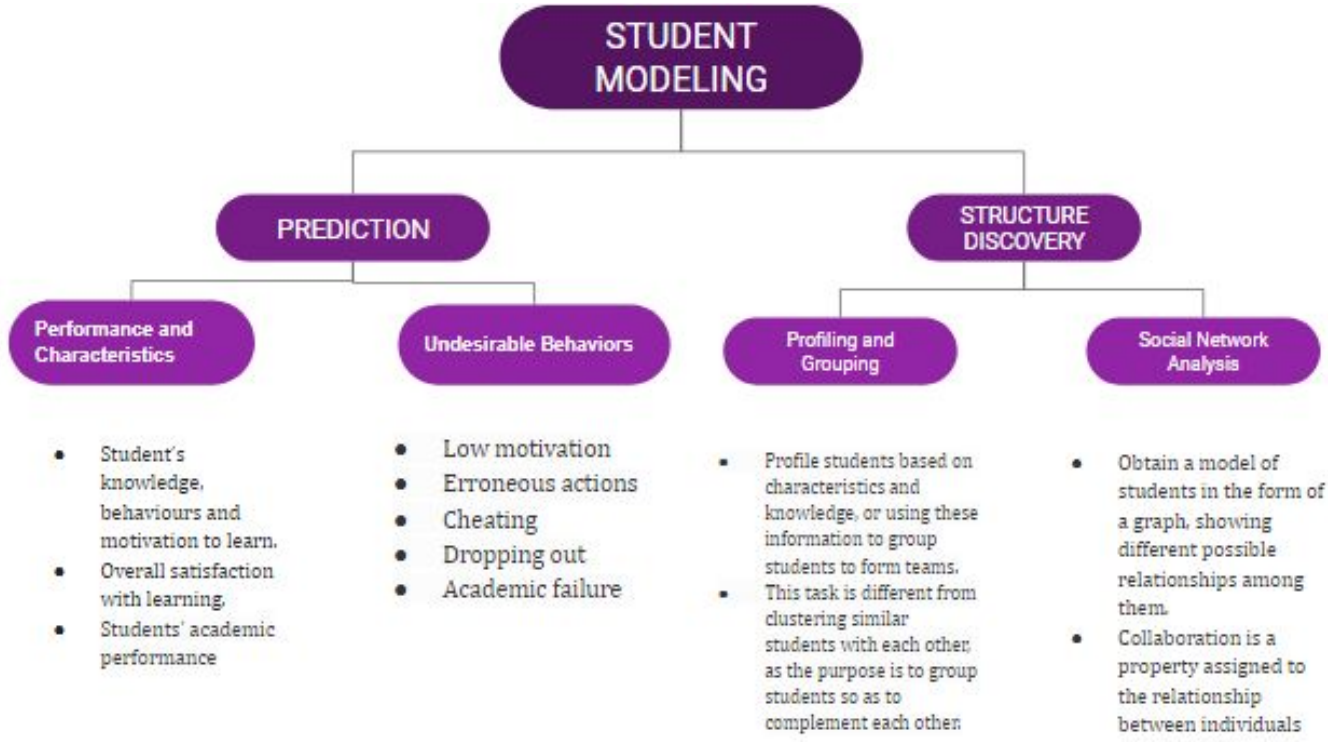
EDM IMPLEMENTATION:

1. **Decision Tree Analysis** - Performance prediction which identify key predictors
2. **Time Series Analysis** - Predict future behavior based on behavior in the past
3. **Cluster Analysis** - Group into clusters which describe the shared characteristics of the students in the cluster
4. **Sequential Association Analysis** - Tracking and analyzing the course; determine if path predicts learner outcome.

APPLICATIONS:



STUDENT MODELING:



DECISION SUPPORT SYSTEM:

It enhances the process of learning by helping stakeholders make decisions. The target is mostly instructor, sometimes students, administrators or researchers.

- **Provide reports -** Feedback on student performance, Describe connections & collaborations, Create reports from profile info
- **Create Alert -** Detect unwanted behavior. Eg: Low motivation, misuse, cheating
- **Planning, Scheduling -** Plan future course, Resource allocation, Course enrollment planning
- **Creating Courseware -** Automatic course material prep using student info
- **Developing concept maps -** Map different concepts to each other. Eg: Hierarchy of topics, relation between test item & skill/knowledge
- **Generating recommendation -** Course rec to student/test rec to instructor

CURRENT ISSUE IN EDUCATIONAL DATA MINING:

- Combining needed data from different systems, which can be difficult.
- Establishing safeguards for privacy and ethics of data use
- In terms of Education, making formal education relevant in world where information is everywhere.
- Adapting to increasingly diverse learner population online and face-to-face.

REFERENCES:

- Research Papers:

1. https://link.springer.com/article/10.1007/s10639-017-9616-z
2. https://airccse.com/oraj/papers/1114oraj04.pdf

- Github Link: https://github.com/CourseReps/ECEN689-Fall2018/blob/master/Tutorials/tutorial_educational_data.md
- Websites: https://jedm.educationaldatamining.org/index.php/JEDM