Politecnico di Torino
Dipartimento di Automatica e Informatica

PhD in Computer and Control Engineering
34th cycle

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# AIED: Artificial Intelligence for Learning Environments

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1. Context

My research topic is learning analytics (LA) and more specifically the use of artificial intelligence in education to create useful tools to improve teaching and learning. These can be divided into two areas: (i) those useful for *student's outcome prediction* and those that allow to *enrich educational resources*.

2. Student's outcome prediction

The main research questions were: how well can we predict exam outcome in different educational contexts? An initial study was conducted by examining first-year academic courses at Politecnico di Torino during 2018/2019 condensing as data both static personal features (i.e. age, gender, high school grade, entry test grade ...) and features derived from activity on the course (i.e the use of educational materials and video lectures) whose values change as the course progresses.
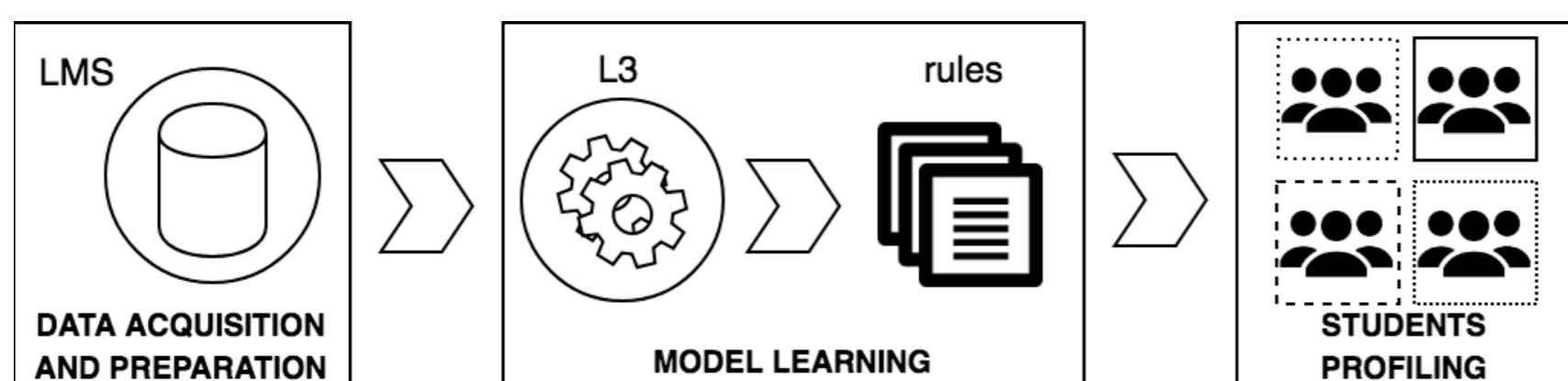

In this regard, I have created a tool that automatically allows to obtain prediction rules using the l3 classification algorithm and consequently to profile students, deriving specific recommendations..

A second study focuses on programming courses and the application of Machine Learning (ML) techniques to VCS usage data to early predict students' exam outcomes. Visual Explainable Student performance PrEdictor allows end-users to apply ML
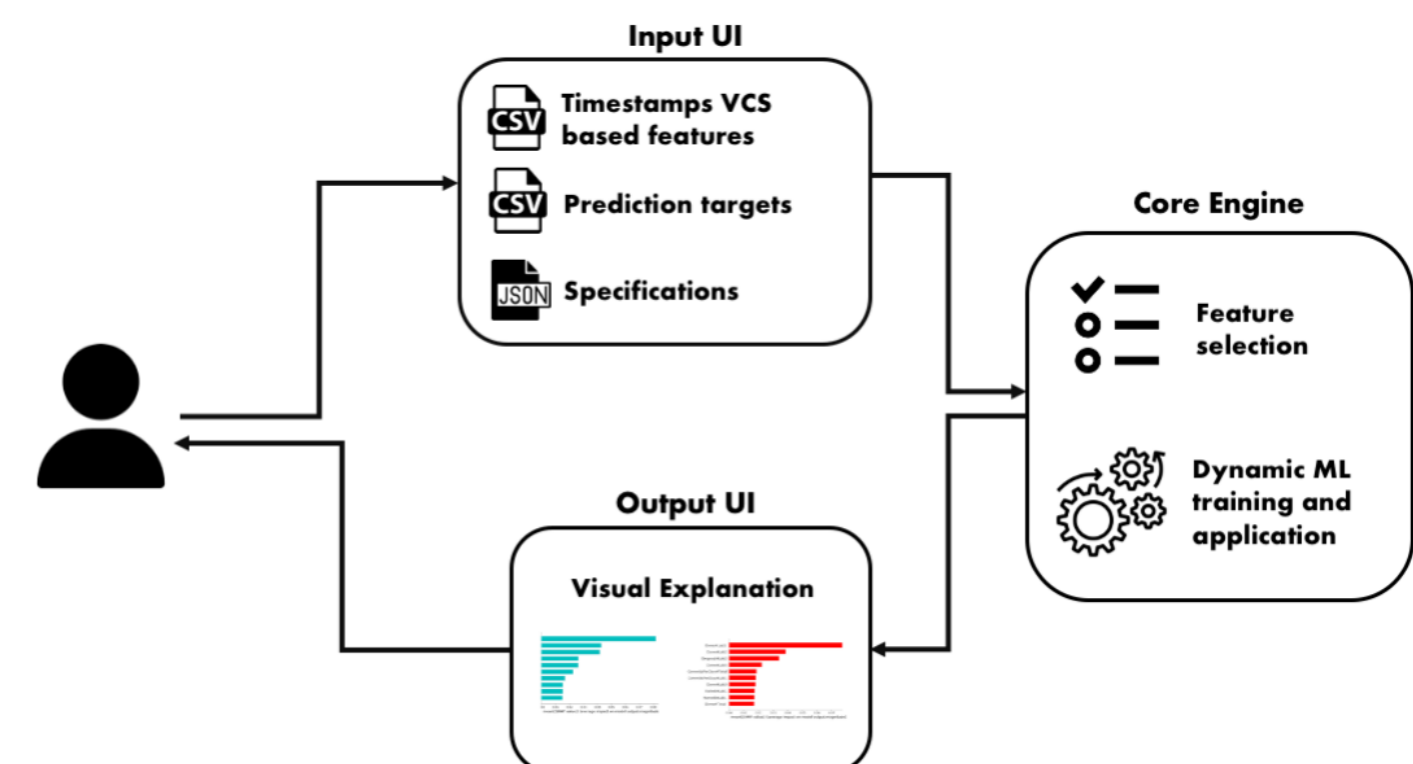
models trained at different course stages and compare them by exploiting ad hoc visual explanations.

3. Enrich educational resources
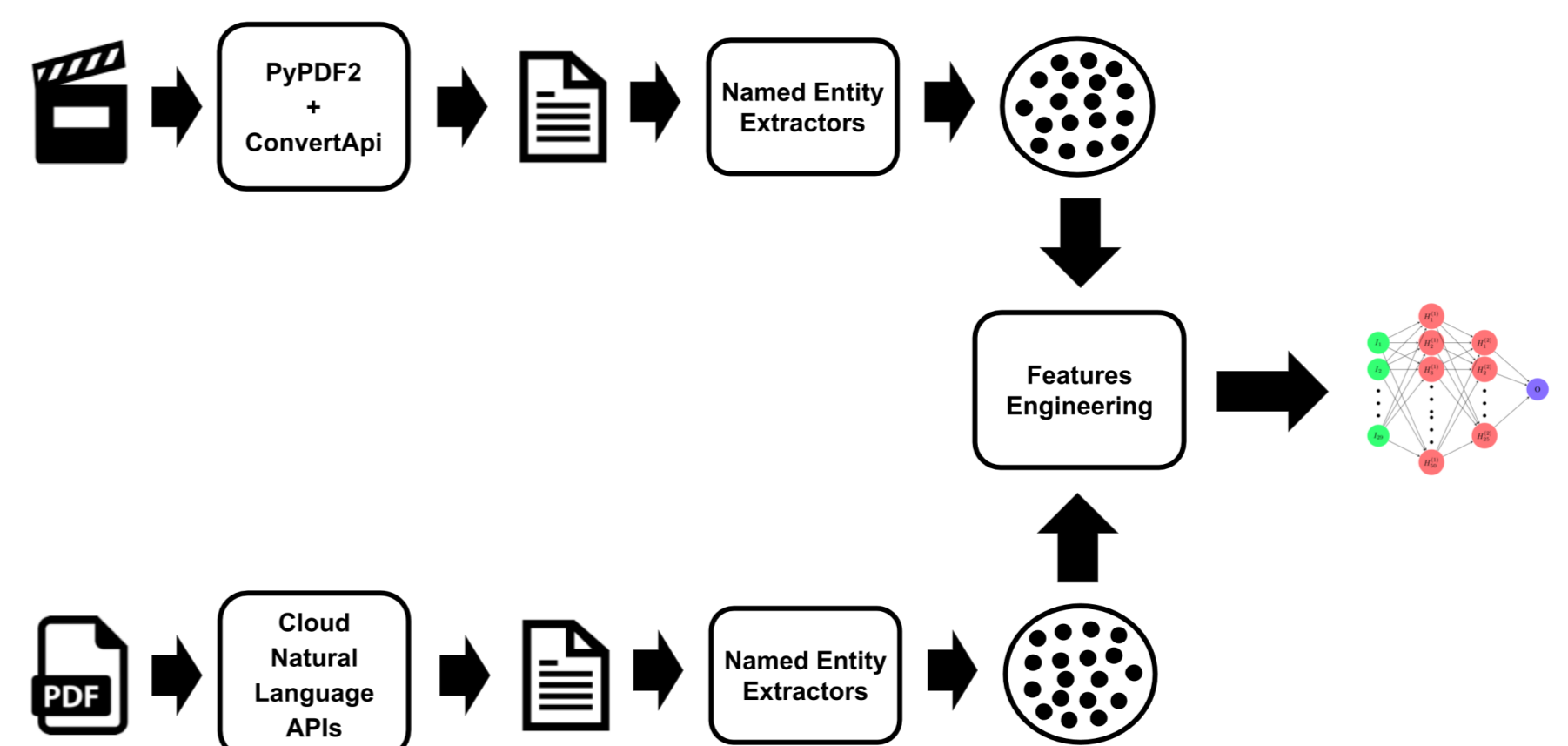
An early work proposed a system developed and implemented in our university for video lecture annotation and indexing. The proposed approach evaluates semantic pertinence of the candidate entities to the main subject of the video lectures. A second study focused on retrieving cross-media educational resources (i.e., from text snippets to videos and vice versa).

4. References

1. VISA: A supervised approach to indexing video lectures with semantic annotations / Cagliero, Luca; Canale, Lorenzo; Farinetti, Laura. IEEE 43rd Annual Computer Software and Applications Conference (COMPSAC 2019)

2. Predicting student academic performance by means of associative classification / Cagliero, L.; Canale, L.; Farinetti, L.; Baralis, E.; Venuto, E.. - In: APPLIED SCIENCES. - ISSN 2076-3417. - 11:4 (2021), pp. 1-22.

3. From teaching books to educational videos and vice versa: a cross-media content retrieval experience / Canale, Lorenzo; Farinetti, Laura; Cagliero, Luca. IEEE 43rd Annual Computer Software and Applications Conference (COMPSAC 2021) .