

Research Problem

- Lack of connection between MOOC recommenders’ and consumers’ preference for video production styles
- Existing products do not cater to individual taste in video styles in recommending MOOCs.
- Current implementations identify an individual’s preferred video style by identifying their learning style based on Felder-Silverman's Index of Learning Styles questionnaire[1] that consist of 44 questions. This approach is exhausting and takes a lot of completion time[2].
- Consumers have to search in different platforms to identify good MOOCs.


Background & Literature

Features	Class Central	My MOOC	MOOCRec	MOOCRec V2 Proposed Solution
Direct learning style identification	X	X	X	✓
Video Production Styles	X	X	✓	✓
Complex and mixed video production styles	X	X	X	✓
Identify the spoken language of the presenter	X	X	X	✓
Search filter based on specific keywords / topics	X	X	✓	✓
User profile and dashboard	X	X	✓	✓
Online discussion forums analysis and extraction of sentiments of forum posts for better MOOC recommendations	X	X	X	✓

Objectives


- A catalogue of MOOCs from most popular providers
- Forum activity across platforms are analyzed automatically

Hub for MOOCs




- Identifying user's learning styles by a more interactive method
- Use the sentiments of other users

Personalized MOOCs



- Accurately classify a wide range of video production styles
- Efficiently classify using parallel processing

Parallel Image Classification



System diagram and possible solution

The diagram illustrates the system architecture, divided into three main layers:

- Frontend:** Contains the **User Interaction Extractor** and the **Frontend User Interface**, which interact with each other.
- Backend: Application Layer:** This layer handles data processing and recommendation logic. It includes:
  - MOOC Sites:** Future Learn, edX, and Coursera.
  - Discussion Forums/Spaces:** Reddit and Coursera.
  - Video Scraper(s)/Extractor(s):** Extracts video data from MOOC sites.
  - Forum Crawler(s):** Extracts forum data from discussion spaces.
  - Reducer and Service Orchestrator:** Manages the flow of data and processing tasks.
  - NLP Engine and Sentiment Extractor:** Analyzes forum posts for sentiment.
  - Metadata Processor:** Processes video metadata.
  - REST API:** Provides an interface for external services.
- Backend: Database Layer:** Stores data in two databases: **MOOC Data** and **User Data**.

Methodology

- Consists of multiple, independent and decoupled components which either exposes a RESTful API or run as a background service.
- Each component consumes its own NoSQL database (MongoDB) and communicates with other databases via the exposed APIs.
- Docker is used for containerizing the image classifiers to aid in parallelization and distribution of image classifiers.
- Natural Language Processing is used to extract forum posts.
- VGG16 model is used as the base of image classification.

Developed solution

Results and Discussions

- Identify 5 video production styles associated with MOOCs with over ~95% accuracy.
- Extract and identify sentiments within forum posts associated with MOOCs with over ~98% accuracy.
- Identify the consumer’s preferred video style directly with over ~80% accuracy by analyzing consumer’s engagement with each video style.
- Learning style to video style mapping used in MOOCRec V1 is only around 25% accurate compared to identifying consumer’s preferred video style by analyzing their engagement.
- Completing the interactive video session in MOOCRec V2 is considerably faster and easier to complete compared to filling out the lengthy ILS questionnaire provided in MOOCRec V1.
- Reduce image classification time by up to 46% and reduce cost of processing by up to 86% cost savings by parallelly distributing the workload. However, this approach is not as fast as using GPU based classifications.
- By combining a more straight-forward and accurate way of identifying consumer’s preference with forum-based scores generated by extracting sentiments of consumer reviews, MOOCRec V2 is able to provide better recommendations to its consumers.

Conclusion

- MOOCRec V2 provides an elegant way to find MOOCs that suits an individual, introducing a dimension of personalization by only recommending types of MOOCs that the consumer will most likely to engage more and complete more.
- Furthermore, this bridges the gap between MOOC providers such as Coursera, FutureWorld and MOOC rating and searching sites such as Class-Central by associating a forum based score to each MOOC indexed by the platform.

References

[1] R. M. Felder, “A Longitudinal Study of Engineering Student Performance and Retention. IV. Instructional Methods,” *J. Eng. Educ.*, vol. 84, no. 4, pp. 361–367, 1995.

[2] M. J. Roszkowski and A. G. Bean, “BELIEVE IT OR NOT ! LONGER QUESTIONNAIRES HAVE LOWER RESPONSE RATES,” vol. 4, no. 4, pp. 495–496, 1990.

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