9-15-2021

Need of Facet Analysis of MOOCs: A Review and Feasibility Study

Abhinandan Kumar
Research Scholar, DLIS, Central University of Himachal Pradesh, abhi.rs.cuhp@gmail.com

Dr. Pawan Kumar Saini
Assistant Professor, DLIS, Central University of Himachal Pradesh, pawankumarsaini@hpcu.ac.in

NEED OF FACET ANALYSIS OF MOOCs: A REVIEW AND FEASIBILITY STUDY

Kumar, A.[1] and Saini, P.K.[2]*

[1]Research Scholar, DLIS, Central University of Himachal Pradesh, India

[2]Assistant Professor, DLIS, Central University of Himachal Pradesh, India

*abhi.rs.cuhp@gmail.com

*pawankumarsaini@hpcu.ac.in

Abstract

Purpose –The motive of this study is to examine the aptness and approachability of existing recommender system and search engines of Massive Open Online Courses (MOOCs). Furthermore, the paper presents a pilot study to expose the appropriateness of faceto-analytical approach to search and retrieve.

Design/methodology/approach – Features and model of recommender systems and search engines of MOOCs is explored by review. Concurrently, relevance of faceted classification model for information retrieval is also analysed. After due consideration, a tentative faceted classification model of MOOCs is developed. Data are collected from various sources like-MOOCs platforms, handbooks and glossary of online learning terms. The final enumeration of facets is based on analysis, synthesis and several guiding principles for selecting facets.

Findings – There is a strong need to incorporate more features of MOOCs in existing recommender system and search engine. Better personalization for learners is also required. At preliminary stage, the facet analysis paradigm has been considered the most pertinent remedy to resolve the problem identified in this study. In the provisional faceted classification model of MOOCs, 23 facets are enumerated with examples.

Originality/value – The present study will pave the way for the development of integrated search interface for MOOCs. After exhaustive study a conceptual model may be formulated to develop a practical tool and facilitate learners with faceted search and smooth navigation.

Keywords: MOOCs, Facet Analysis, Search and Retrieval.

1. Introduction

In the field of learning, Massive Open Online Courses (MOOCs) have gained unexpected growth. Until 2020, 180 million learners are enrolled in 16.3 thousand courses offered by 950 universities worldwide. The Covid-19 pandemic and lockdown has made its relevance even stronger. About 33% of learners among all registered learners have registered in the year 2020 only. Managing this vast growth properly and delivering appropriate services to the clients is a great challenge. We must have visionary plans, proper platform and effective tools to tackle the challenge.

Exact matching of MOOCs and learners is one of the basic challenges amidst the proliferation of both. This challenge is being acknowledged in several research study as research problem. Various approaches, methods, systems and models are discussed and applied to solve this issue. Some of the meaningful attempts regarding this problem are - Case Based Recommender System, MOOC Recommender Search Engine (MRSE) and multi-attribute weight algorithm based on collaborative filtering (CF). Several MOOCs search engines such as- Class Central, My Mooc and Coursetalk are also serving the learner. However, the existing tool developers are still trying to attain appropriate terminology, multiple search facility and optimum coverage of characteristics of MOOCs.

An integrated search interface for MOOCs is needed that facilitate learners with multiple search filters and easy navigation system. For the evolution of such integrated search interface, pertinence of facet analysis of MOOCs is discussed in this study. Key components and characteristics of MOOCs is analysed and synthesized as per several guiding principles for facet analysis. As a result, a typical conceptual model for the organization of MOOCs has emerged. Formulation of this model specifies that complete set of facets may be enumerated and categorised after full-scale study. Consequently, practical tool for faceted search and navigation may also be launched.

2. Problem Statement

Research problems identified in this study are:
- How to evolve an unsegregated platform to browse through various MOOCs?
- How to probe, elucidate and grasp MOOCs?

3. Research Question

As per the research problem following research question is formulated-

- How to organize MOOCs to empower multi-perspective exploration?

4. Research Objective

To answer the research question properly, the attempted research objective are as follows

- To analyse and synthesize components of MOOCs.
- To enumerate facets of different category for developing a typical conceptual model.

5. Literature Review

Findings of some significant study in connection with the present investigation may be consolidated as:

- Bousbahi, F. and Chorfi, H. (2015) points out that "with MOOCs proliferation, learners will be exposed to various challenges and the traditional problem, finding the best learning resources, in TEL is more than ever up to date." To defeat this trouble, recommender systems is developed in their study. The proposed system is under execution and intended to try out in real-world situation. The system has limited search features.
- Aryal, S et al. (2019) found that "no system has been implemented yet that recommends courses to a learner from different MOOC platform based on his learning style and other personalized needs and requirement." To get rid of this problem, a sophisticated educational platform named MoocRec is developed by mapping the standard video style with the learning style of MOOCs. The purpose of this platform is to provide a unique personalization approach based on which MOOCs are recommended to a learner. The current version of MoocRec is limited to computer science courses along with Felder and Silverman learning style model from edX and Coursera platform. The mapping of MOOCs involved in this platform is also narrow. Mapping is only based on literature and empirical validation is not done yet.
- Alzahrani, K. and Maccawyb, M. (2019) narrated the problem as- "Having too many MOOCs with a large number of courses and too many results is a limiting issue, especially for recent graduates. Hence, there is a need for a unified searching

tool that provides the best of both worlds; one that presents results from different sources (MOOCs) and personalizes these results as well." Challenge of solving the 'lost in hyperspace' problem is explored in detail in their study. Simultaneously, obstacles and shortcomings of all existing MOOCs recommender systems and search engines is also discussed. The study proposes a unique MOOCs Recommender Search Engine (MRSE) which combines in the search engine, both content-based filtering and a recommender system. To fetch internal course data from different MOOCs is a challenge for this system. Assessment of effectiveness and efficiency of this model cannot be done because this model is under implementation phase.

- In a study bearing the title 'The need for a faceted classification as the basis of all methods of information retrieval' the potentiality of facet analysis is expressed as- "It gives a rational, scientific, methodology for the construction of systems; it enables the full and precise description of objects of considerable structural complexity and of multi-dimensional semantic composition; it provides a flexible syntactical apparatus for the combination and ordering of concepts where this is required."(Broughton, V.,2006). Broughton further asserted that:
  a) Faceted classification model can function as a tool for browsing, navigation and retrieval.
  b) Act as a means of spatial organisation of information in digital as well as in physical space.
  c) In query formulation- modification, vocabulary control and for mapping onto and between terminologies facet analysis have an important role

In the aforesaid review, it is obvious that facet analysis has not been used in any systems developed so far to search and retrieve MOOCs. It is also evident that facet analysis is most suitable, logical and popular approach to search and navigate. So proper attempts should be made to develop a faceted classification model of MOOCs to search and retrieve. Many existing problems of current system may be solved by this approach.

6. Methodology

The methodology adopted in this study involves:

a) Data are collected from various sources like- MOOCs platforms, handbooks and glossary of online learning terms.
b) Key components as well as characteristics of MOOCs is analysed and synthesizes.

c) Principles to select the facet are shown in the table below:

Differentiation	Facets should be easily distinguished among the constituent units.
Relevance	The selected facet should be subject, scope and purpose oriented.
Ascertainability	Measured features of division should be expressed by facets
Permanence	Only permanent features of subject are expressed by facets.
Homogeneity	Only one divisional attribute should be indicated by facets.
Mutual exclusivity	Each facet has only its own coverage
Fundamental categories	Category of facet is determined on the basis of nature subject under consideration.

Table 1: Principles to select the appropriate facets

d) Facets are categorised into Five fundamental Category (PMEST) postulated by Dr. Ranganathan (1952)-

- Personality- It is the distinguishing characteristic of MOOCs.
- Matter- It is the physical material of which MOOCs is associated.
- Energy- It is any action that occurs with respect to MOOCs.
- Space- It is the geographic and virtual component of the location of MOOCs.
- Time- It is the period associated with MOOCs.

7. Category wise enumerated list of facets with examples

7.1 Facets enumerated in Personality Category-

Fundamental Category	Facets	Example of Foci
Personality	General	Course Name, ID, Language, Level, Provider, Target Audience, Vision, Commercial, Non-profit
	Resources	Human, Intellectual
	Type	Network-based, Task-based, Content-based
	Cost	Completely free, Fee for certification, Freemium
	Topic	General education, Math, IT, Lifestyle, Science, Health, Humanities, Business, Math, Healthcare, Life sciences, Finance, Language
	Participants	Teachers, Students, Working Professional, Parents, Business Owners, Lifelong Learners, Hobysist
	Variant	aMOOC, bMOOC, BOOC, cMOOC, COOC, DOCC, Flex-MOOC, mMOOC, MOOL, MOOR, MOOS, pMOOC, POOC, sMOOC, SMOC, SPOC, SPOC, xMOOC, VOOC, Corporate MOOCs (Pilli, O., & Admiraal, W.,2016).

Table 2: Facets and example of foci in personality category

7.2 Facets enumerated in Matter Category-

Fundamental Category	Facets	Example of Foci
Matter	Equipment	Hardware, Software, Courseware
	Learning Contents	e-Books, research papers & journals, Video, presentations, Case Studies, illustrations, Related Links, Articles, Self-instructional material, case studies.

Table 3: Facets and example of foci in matter category

7.3 Facets enumerated in Energy Category-

Fundamental Category	Facets	Example of Foci
Energy	Scenario (for Production and delivery)	Centralised, Industrial, Collaborative-Decentralised
	Pedagogy	Pedagogical Approach, Instruction, Interactive Multimedia, Animation, Simulations, video demonstrations, Virtual Labs, Self-Paced Learning
	Communication	Collaboration, Interaction
	Involvement	Industry, Institute, Community, Partnership among them
	Assessment	Performance Appraisal,
	Support	Instructional Media, Personalization Tools, User Friendly Mobile App, FAQs, Graphical User Interface for Interaction, Discussion forum
	Purpose	Provider, Learner, Industry, Government, Community
	Content License	All Rights Reserved, Creative Commons licences, Different course licenses.

Table 4: Facets and example of foci in energy category

7.4 Facets enumerated in Space Category-

Fundamental Category	Facets	Example of Foci
Space	Virtual Platform (for hosting)	SWAYAM, Canvas Network, Udemy
	Complementary Social Media Platforms	Facebook, LinkedIn, You Tube
	Host Institution Address	Any Physical Space address

Table 5: Facets and example of foci in space category

7.5 Facets enumerated in Time Category-

Fundamental Category	Facets	Example of Foci
Time	Duration	One week, Two week
	Important Dates	Date of enrollment, Start Date, End Date
	Establishment year	Platform, Course
	Frequency	Annual, twice in a year

Table 6: Facets and example of foci in time category

8. Conclusion

Nowadays, enormous growth in the field of e- learning, especially in MOOCs, is being noticed. Major factors behind this multiplicity are far-reaching coverage of telecom-internet services, covid-19 pandemic, lockdown and interest of stakeholders. Amidst the abundance of MOOCs, a learner feels difficulty in selecting the specific MOOCs and get confused. This problem is getting complicated in parallel with the proliferation of MOOCs. Thus, a unified platform for exploration and comprehension of MOOCs is essential for learners.

Features of search and retrieval depends upon approach, method and model of organization. The recommender systems and search engines of MOOCs reviewed in this study have different approaches and models. However, the necessity of standard terminology, better personalization, optimum coverage of characteristics of MOOCs still persists. To fulfil these persisted necessities, potential of facet analysis approach is exposed in this pilot study. By using the methodology of facet analysis, a conceptual preliminary faceted classification model of MOOCs is formulated and demonstrated. In this formulated model total 23 categorised facets are enumerated with example.

Consequently, the result and findings of this study justifies and guides further in-depth study to formulate the final and complete faceted classification model of MOOCs.

References:

1. Alzahrani, K., & Maccawyb, M. A Hybrid Personalization Model for Searching Multiple MOOCs.

2. Aryal, S., Porawagama, A. S., Hasith, M. G. S., Thoradeniya, S. C., Kodagoda, N., & Suriyawansa, K. (2019, April). MoocRec: Learning styles-oriented MOOC recommender and search engine. In 2019 IEEE Global Engineering Education Conference (EDUCON) (pp. 1167-1172). IEEE.

3. Bousbahi, F., & Chorfi, H. (2015). MOOC-Rec: a case-based recommender system for MOOCs. Procedia-Social and Behavioral Sciences, 195, 1813-1822.

4. Broughton, V. (2006). The need for a faceted classification as the basis of all methods of information retrieval. In Aslib proceedings. Emerald Group Publishing Limited.La Barre, K. (2010). Facet analysis. Annual review of information science and technology, 44(1), 243-284.

5. Ciloglugil, B., & Inceoglu, M. M. (2016, July). A felder and silverman learning styles model based personalization approach to recommend learning objects. In International Conference on Computational Science and Its Applications (pp. 386-397). Springer, Cham.

6. Lane, L. (2012). Three Kinds of MOOCs. Lisa's Teaching Blog. [Online] Available: http://lisahistory.net/wordpress/2012/08/three-kinds-of-moocs/

7. Pilli, O., & Admiraal, W. (2016). A Taxonomy of Massive Open Online Courses. Contemporary Educational Technology, 7(3), 223-240.

8. Shah, D. (2020, November 30). By The Numbers: MOOCs in 2020. Retrieved from classcentral.com: https://www.classcentral.com/report/mooc-stats-2020/

9. Spiteri, L. (1998). A simplified model for facet analysis: Ranganathan 101. *Canadian journal of information and library science*, 23(1-2), 1-30.

10. Wang, Y., Liang, B., Ji, W., Wang, S., & Chen, Y. (2017). An improved algorithm for personalized recommendation on MOOCs. International Journal of Crowd Science.