E-Learning Platform Development Bodhitree

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Outline

- Introduction
- MOOCs variants
- Design perspectives
- Evaluation techniques
- Instructional quality of MOOCs
- MOOCs potentials
- Bodhitree
- Conclusion & future work

Introduction

- E-Learning concept
- Definition
    - Massive: many participants (hundreds to thousands)
    - Open: free of cost, anyone can register
    - Online: available on internet
    - Courses: curriculum unit
- Recent developments
    - CCK'08 - First MOOC
    - Rise of providers: Coursera, Udacity, EdX
    - Other platforms: NPTEL, Open2Study
    - Quasi MOOCs: Khan Academy, Peer-to-peer University (P2PU)

Challenges in MOOCs

- High dropout rate
- Assessment
- Feedback
- Lack of human interaction
- Self-learning centered
- Actual access to only privileged ones

MOOC vs Learning Management System

	MOOC Platforms	**LMS**
Goal	*replace* classrooms	*assist* classrooms
Course building	can be built	Resource holder
Networking	More (blogs)	Less (wiki,forums)
Size,scalability	Large size, highly scalable	Small size
Access	Lifelong access	Limited duration access
Establishments	Late 2000's	Early 1960's
Examples	Coursera, EdX	Moodle, Blackboard

MOOC variants

- Attributes of MOOCs
  - Massive, open, online, courses
  - Discussion boards
  - Online quizzes, instruction videos, reading materials
  - Evaluation: Peer grading and auto grading
  - Social networking

xMOOC vs cMOOC

Criteria/Variant	**xMOOC**	**cMOOC**
Full form	Extensive MOOCs	Connectivist MOOCs
Dedicated platform	Yes	No, (shared platform/ social media)
Content	Instructor driven	Participant driven
Network Dependence	Large, few active participants	Moderate, active learners
personal interactions	Very less	High
Assignments/Exams	Computer based online	No formal assignments
Discussion Space	Dedicated, unmoderated	Use of social networking sites
Assessment	Auto-grading	Peer grading
Feedback	Not supported	Peer feedback
Learning Analytics	Supported	Not supported
Certification	Supported not accepted (non-credit)	Not supported (autonomous learners)
Examples	Coursera, EdX	EduMOOC, CCK08

Adaptive MOOCs

- Concept
- Learning strategies: apprentice, inductive, incidental, deductive, discovery
- Content reorganization
- Collaborative nature
- Multiple paths for problem solutions
- Intelligent feedback
- Personalized learning environment

MOOCs: Types and Relation with classroom teaching

Figure: MOOCs: Types and relation

Foundation Stones for design

Ref: Assembling pieces of MOOCs jigsaw puzzle- Sivamuni et al.

Design criteria

- Technological criteria
    - User interface
    - Video content
    - Learning & social tools
    - Learning analytics
- Pedagogical criteria
    - Lecture organization
    - Cultural diversity
    - E-Assessment
    - Peer assessment

Evaluation Schemes

- Instructor grading
- Automated grading
- Peer grading

Automated grading vs peer grading

Criteria/Scheme	**Automated Grading**	Peer Grading
Evaluator	Machine	Course participant
Grading Scale	Prefixed	Dependant on submission type
Score Bias	Not biased	Biased
Variance from True Score	Large	Moderate
Multiple Choice Questions	Supported	Supported
Short Answer	Supported	Supported
Essay/Long Answer	Not supported	Supported
Feedback	Not supported	Supported(peer feedback)
Ground Truth Submissions	Not required	Supported
Supported MOOC Types	xMOOC	cMOOC, xMOOC(small sized)

Table: Evaluation Techniques

Automatic Essay Scoring

- AES-Holistic grader
  - Overall score
  - Varies from true score
  - Effective in short answer type questions
- AES-Rubrics grader
  - Multiple scores based on rubrics
  - Predecided rubrics
  - Final score is average
  - Effective in long answers/essay type questions
- Limitations

Peer grading models

Aim :Estimate the true score of peer graded submissions.

Terms:

1] True score (S_u) for a submission u : unknown/to be estimated.

2] Grader bias (b_v) of grader v: tendency to inflate or deflate from actual score.

3] Grader reliability(τ_v): the closeness of bias-corrected score to true score

4] Observed score : median of set $(Z = z_v^u)$ of scores assigned by all peer graders.

Objective $= P(\{S_u\}_{u \in U}, \{b_v\}_{v \in V}, \{\tau_v\}_{v \in V}|Z)$

Circular dependence: S_u and b_v, posterior probability: **hard to compute**.

Gibbs sampling to sample true score; average:- sampled true score $\hat{S_u}$.

First principles of instruction

Ref: Instructional quality of MOOCs - Margaryan et al.

Myths about MOOCs

- MOOCs will affect instructional quality, faculties and TAs will be fired
- MOOCs does not support small-group discussions, face-to-face interaction with instructor
- MOOCs distract faculties from improvisation in on-campus pedagogy
- MOOCs reduce diversity of teaching methods

Potential research areas

- Educational Data mining & Learning analysis
- Social network analysis methods
- E-portfolio
- Competence management
- Self-review
- Lifelong technical support
- Content personalization
- Certification

Overview

- Bodhitree is a platform being developed in CSE Department, IIT Bombay.
- Aim: to provide quality education through personalized, flexible, complete learning.
- Encourages blended MOOC concept.
- Course format: similar to xMOOCs.
- Instructional videos with embedded quizzes
- Student progress is recorded.
- Course materials: form of chapters
- Discussion forums and chat-rooms

Architecture

Figure: Tiered Architecture

Conclusion

- Selection of *platform* is non-trivial.
- Idea design specifications to be followed strictly. Evaluation techniques to be improved.
- Learning analytics & effective feedbacks are necessary.
- Social network tools for building network.
- Grading schemes can be enhanced using auto graders, intelligent peer grading.
- Personalized learning environment creation, need for authoring tools, certification

Thank You

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E-Learning information on Webopedia

Open educational resources

Blended MOOCs

Bodhitree