Online Courses for Lifelong Learning

Presentation to
OSHER Lifelong Learning Institute
Social Media and Digital Technology

October 25, 2012

Douglas H. Fisher
Vanderbilt University

Outline

- Motivations for online learning
- Availability of (free) online learning materials
- Technological and Pedagogical Theory
- Communities of Learners (Global and Local)
- Personalization and Humanization through Technology
- Some history and proposals

Overview Videos

Daphne Koller: http://www.youtube.com/watch?v=U6FvJ6jMGHU

Salman Khan: http://www.youtube.com/watch?v=nTFEUsudhfs

Peter Norvig: http://www.youtube.com/watch?v=tYclUdcsdeo

(Free) Online Education Resources

COURSERA https://class.coursera.org/ (198 courses)

EdX https://www.edx.org (7 courses)

Udacity http://www.udacity.com (14 courses)

Udemy http://www.udemy.com

Khan Academy http://www.khanacademy.org

Examples of MOOCs

coursera COURSES UNIVERSITIES ABOUT ▼ DOUG ▼

Your Courses

Screenshot of https://www.coursera.org

Machine Learning

Aug 20th — Oct 29th

Aug 20th 2012
10 weeks long
Go to class
View course info | Un-enroll

Introduction to Sustainability

Aug 27th — Oct 22nd

Aug 27th 2012
8 weeks long
Go to class
View course info | Un-enroll

Introduction to Mathematical Thinking

Sep 17th — Nov 5th

Sep 17th 2012
7 weeks long
Go to class
View course info | Un-enroll

Software Engineering for SaaS

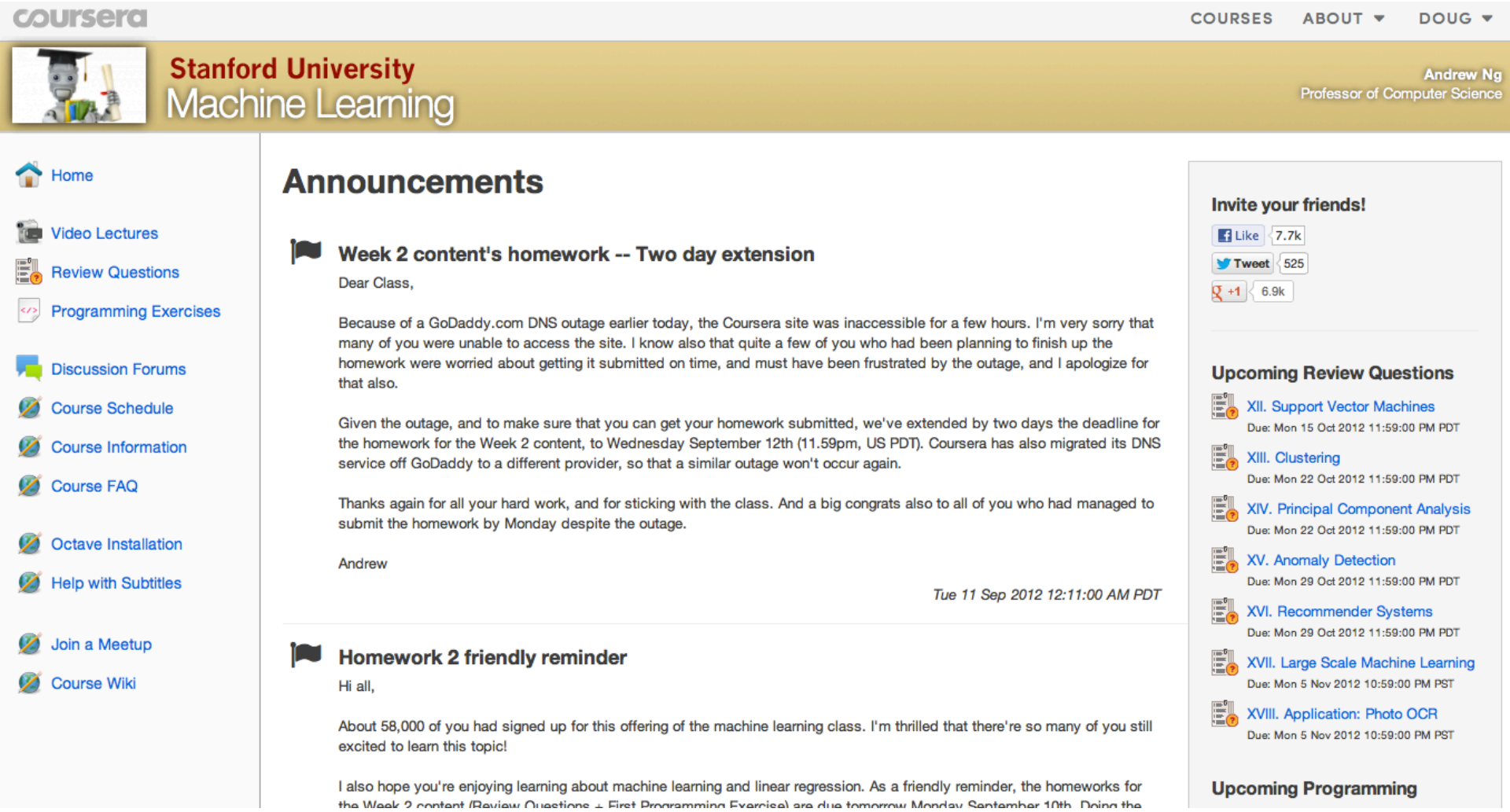
Ended 4 months ago

May 18th 2012
5 weeks long
View class archive
View course info | Un-enroll

Introduction to Databases

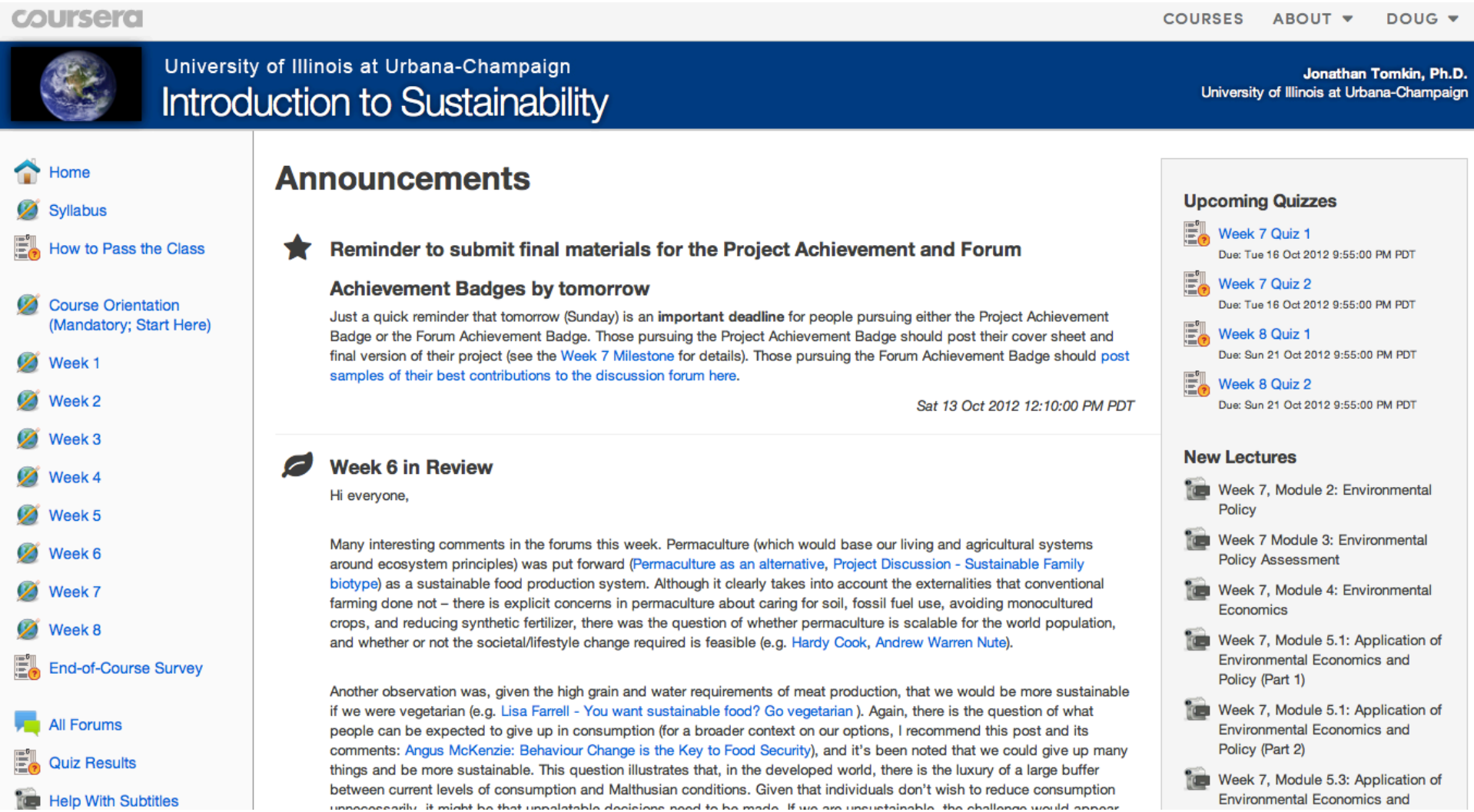
To be announced
10 weeks long

Examples of MOOCs



Screenshot of https://class.coursera.org/ml-2012-002/class/index

Examples of MOOCs



Screenshot of https://class.coursera.org/sustain-2012-001/class/index

Massively Open Online Courses

Accessibility and affordability

"*MOOCs, have the potential to make quality education a basic, international human right.*"★

(but "*MOOCs may pose a grave threat to financially struggling colleges and universities with less prestigious brand names.*" ★)

★Stephen Smith, "The World-Wide U", American Radio Works, americanradioworks.publicradio.org/features/tomorrows-college/keyboard-college/moocs.html

Consortium on Urban and Metropolitan Universities (CUMU) mission: "*… to use the power of their campuses in education, research, and service to enhance the communities in which they are located.*" (http://www.cumuonline.org/about.aspx)

How can MOOCs be folded into CUMU's mission?

An Online Computer Science Curriculum (Basics)

Introduction to Logic (Stanford)

Combinatorics (Princeton)

Learn to Program: Fundamentals (Toronto)

Introduction to Computer Science 1 (Harvard) and 2 (MIT)

CS 101 Introduction to Computer Science (Udacity)

Computer Science 101 (Stanford)

"equivalent" alternatives

Learn to Program: Crafting Quality Code (Toronto)

CS 212 Design of Computer Programs (Udacity)

"equivalent" alternatives

The Hardware/Software Interface (U Washington)

CS 215 Algorithms: Crunching Social Networks (Udacity)

Algorithms Part 1 (Princeton)

"equivalent" alternatives

Algorithms: Design and Analysis, Part 1 (Stanford)

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An Online Computer Science Curriculum (Core)

Algorithms Part 2 (Princeton)

Algorithms: Design and Analysis, Part 2 (Stanford)

"equivalent" alternatives

Automata (Stanford)

Programming Languages (U Washington)

Compilers (Stanford)

Pattern-Oriented Software Architectures (Vanderbilt)

Design of Computer Programs (Udacity)

Software as a Service (UC Berkeley)

Introduction to Databases (Stanford)

Computer Architecture (Princeton)

Computer Networks (U Washington)

CS188.1x Artificial Intelligence (UC Berkeley)

CS373 Artificial Intelligence (Udacity)

An Online Computer Science Curriculum
Technical Electives

Creative, Serious and Playful Science of Android Apps (UIUC)

Creative programing for digital media and Mobile Apps (U of London)

Web Intelligence and Big Data (IIT, Dehli)

Machine Learning (Stanford)

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Malicious Software underground story (U of London)

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AI Planning (Edinburgh)

NLP (Stanford)

Networked Life (U Penn)

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VLSI CAD: Logic to Layout (UIUC)

Coding the Matrix: Linear Algebra CS applications (Brown)

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An Online Computer Science Curriculum
Tech/Soc

Writing in the Sciences
(Stanford)

Internet History, Technology, and Security
(Michigan)

Sci, Tech, Soc in China
(Hong Kong)

Securing
Digital
Democracy
(Michigan)

How to Build a Startup
(Udacity)

Computational
Investing
(GaTech)

Online Games:
Literature,
New Media, and Narrative
(Vanderbilt)

Information Security
and Risk Management
in Context
(U Washington)

Specialized and Tutorial

MySQL Databases
For Beginners
(Udemy)

Differential
Equations
(Khan Academy)

Sciences, Humanities, Arts

few thus far, but enough
To fill out a "major"

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Udemy http://www.udemy.com

Khan Academy http://www.khanacademy.org (about 3,500 videos)

Brief History

Spring 2009: Tried to "flip" my Vanderbilt database class from NSF, using online lectures, but no appropriate material (though lots of good online stuff)

Fall 2011: Stanford Announces three MOOCs in Database, Machine Learning, and AI

Spring 2012: Used Jennifer Widom's online database lectures to "flip" my database classes; incorporated Andrew Ng's online machine learning lectures into my ML course

"*Regarding Professor Widom's videos: On one hand, they are an excellent resource, and not taking advantage of them would be silly. On the other hand, early in the semester, a lot of in-class lectures were a review of the assigned videos for that week, and it felt a bit repetitive. To be fair, I don't honestly know what else there is to have covered during those classes, since we were first learning the basics of thinking in relational algebra terms. Later in the course you did a much better job of taking what we'd learned from her and applying it further than she did. Overall a very good course, and I feel like I learned a lot about a very useful subject.*"

Instructor Average: 4.45 Course Average: 3.63 (no ratings below average)

"*Yay machine learning! The structure of the class maximized the perspectives of ML presented: the videos by Andrew Ng at Stanford covered many of the basic techniques of ML so that we were able to spend our class time discussing deeper levels of ML -- papers about more complicated ML systems, and the results of combining elements of different ML paradigms.*"

Instructor Average: 4.22 Course Average: 4.22 (no ratings below average)

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Summer 2012: Produced a few of my own AI lectures, posted to YouTube, in prep for upcoming AI course, and continue (slowly) to do so

https://www.youtube.com/channel/UCWOFdpEfNuQP3O_JUiwhT8A?feature=watch

Summer 2012: Another academic department "desperately" wanted an ML course offering before next regularly schedule course in Fall 2014

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Summer 2012: Another department "desperately" wanted an ML course offering before next regularly schedule course in Fall 2014

Fall 2012: Running AI course using various online videos, but mainly Norvig and Thrun from Fall 2011, to flip classes; https://my.vanderbilt.edu/cs260/

Fall 2012: Running an ML course as a "wrapper" around the Stanford ML MOOC, which is running at the same time: students do all work required by the MOOC (lectures, quizzes, programs), submit the work for MOOC infrastructure grading, + do additional readings assigned by me, take quizzes on that material, and do a final Project: https://my.vanderbilt.edu/cs390fall2012/

VANDERBILT UNIVERSITY

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Studies in Machine Learning (CS 390, Fall 2012)

Overview | Instructor | Grading | Schedule and Readings | Course blog

Overview

This offering of individual studies in machine learning is a "wrapper" around a COURSERA course on the same topic, adding readings, discussions, and an end-of-the semester project (with a faculty mentor) to the online course offering.

In particular, there will be several components to this individual studies offering during Fall 2012.

Search

Archives

- August 2012

Meta

- Site Admin
- Log out

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Studies in Machine Learning (CS 390, Fall 2012)

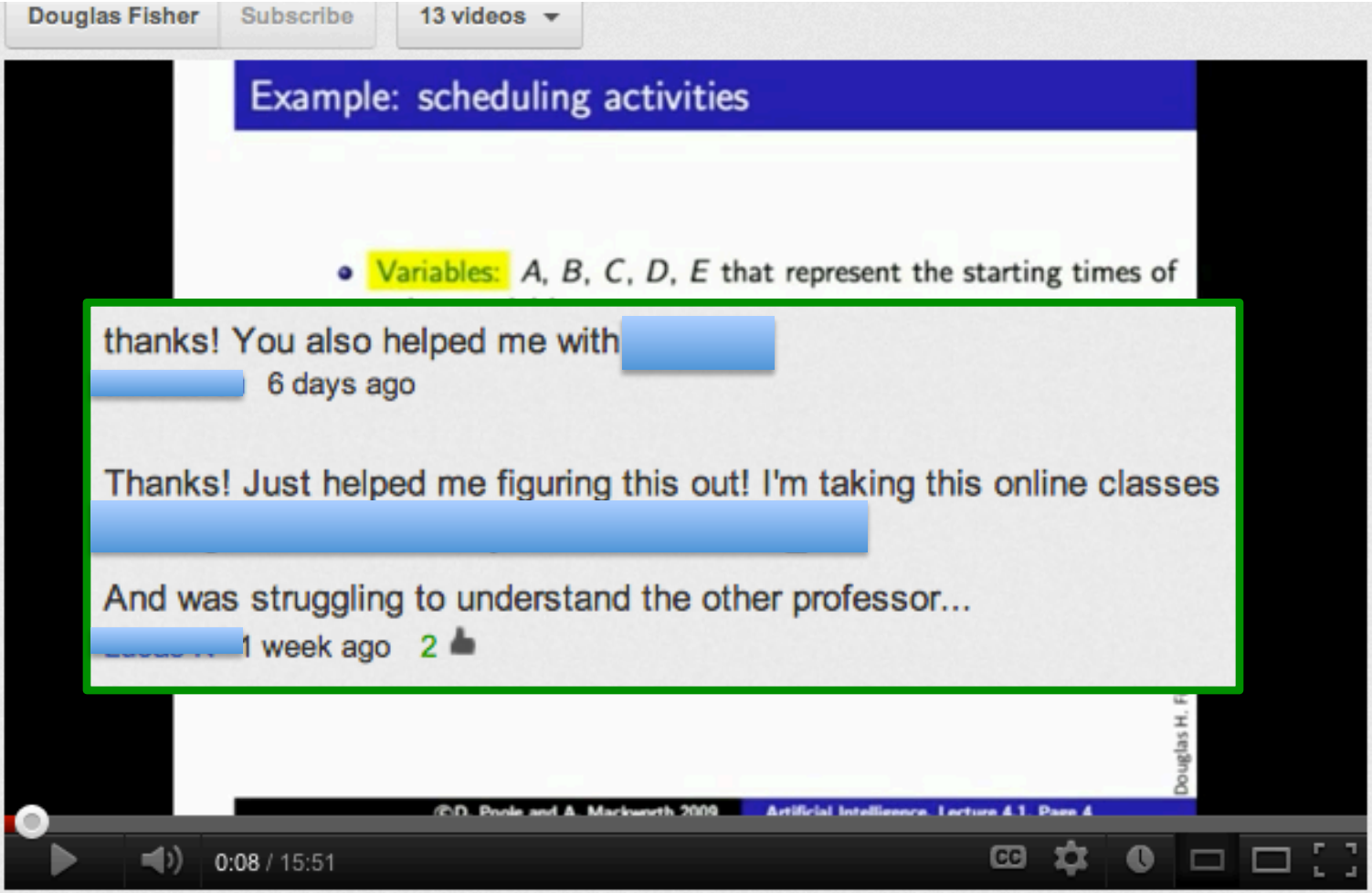
Wednesday, September 19 (5:00 – 6:30) Quiz. Discussion of learning as search paper COURSERA material through week 4 (neural network representation); multi-task learning paper assigned

"*Multitask learning*" (1997) by Caruana:
http://www.springerlink.com/content/x4q010h7342j4p15/

Some neural network systems can be viewed as multitask learning, as can some unsupervised learning systems to be studied later

Wednesday, September 26 (5:00 – 6:30) Quiz. Discussion of multi-task learning and neural networks and COURSERA material through week 5 (neural network learning);

CS 260 AI Video call out from UC Berkeley MOOC



This video is public.

Like | Add to | Share

284 views

Published on Sep 29, 2012 by Douglas Fisher

Examples of the Generalized Arc Consistency algorithm as given in Poole and Mackworth's Artificial Intelligence text

4 likes, 0 dislikes

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What had initially concerned me

- What would students, faculty, and Vanderbilt think of my "outsourcing" lectures?
- What would I do in class if not lecture?

What gets me excited about unfolding online activity

- I feel in community with other educators (for the first time in 25 years of teaching)
- Creating and posting my own content
- Even greater customization across courses and curricula
- Other forms of crowd sourcing educational material (e.g., Wikibooks)
- That students will see community modeled explicitly among their educators
- Leveraging and creating across institution MOOCs

An Online Computer Science Curriculum (Technical Electives)

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community

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Networked Life (U Penn)

Coding the Matrix: Linear Algebra CS applications (Brown)

Social Network Analysis (Michigan)

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Proposals

- An OSHER course that is wrapped around a MOOC

  … with local faculty and student facilitators

- Putting OSHER student material online (we can all be contribute content)

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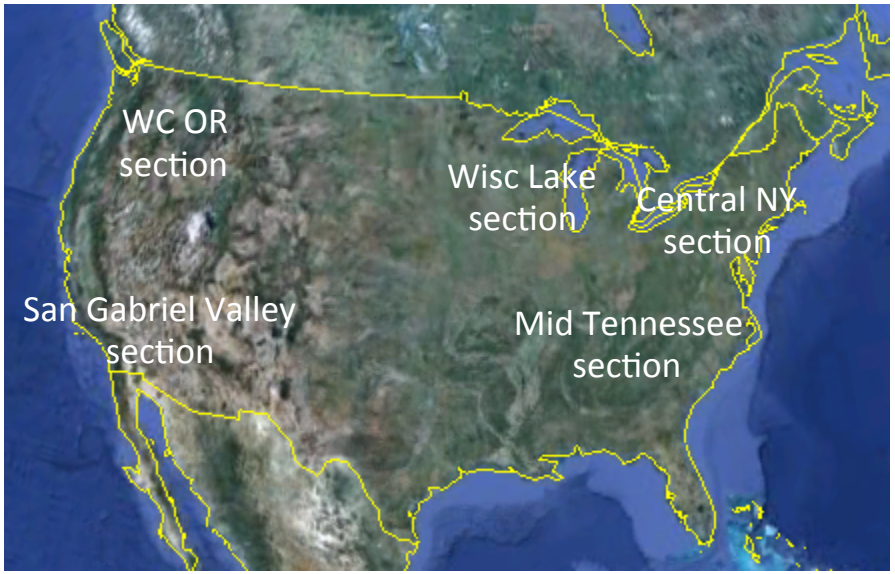
Distributed Shared Courses

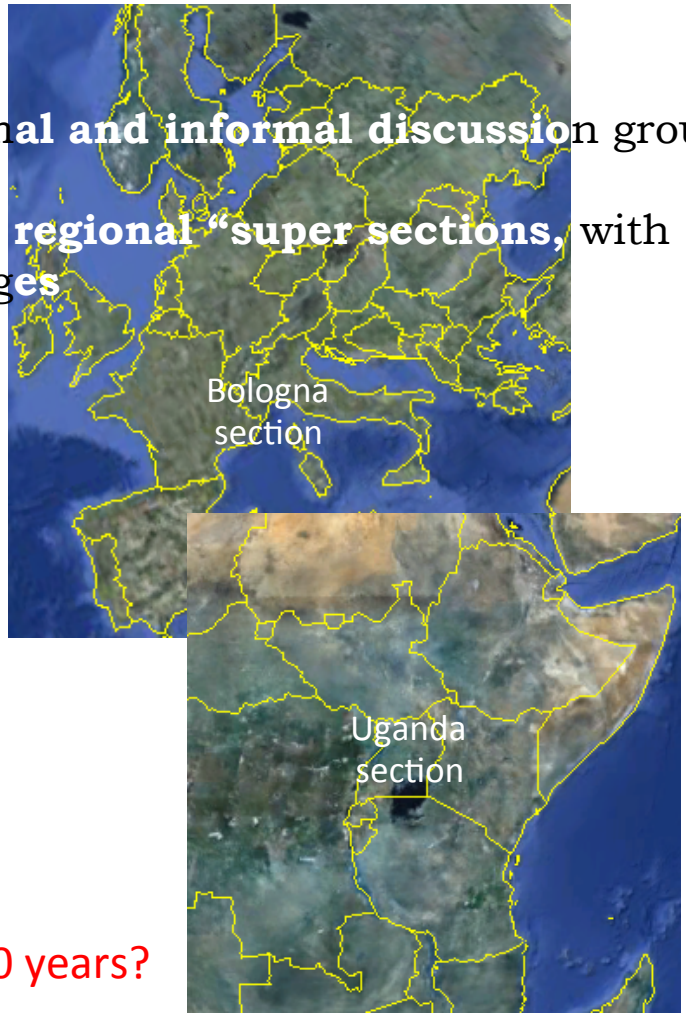
Build on our previous course development activities (e.g., the highly interdisciplinary and popular "State of the Planet" course) by developing a distributed shared course across many institutions

Exploit existing infrastructure (e.g., COURSERA, VaNTH, Wikimedia) to develop and host courses

Virtual technology to manage lectures, and formal and informal discussion groups

Instill a commitment to place through local and regional "super sections," with course activities customized to regional challenges





One general theme: what will my region be like in 40 years?

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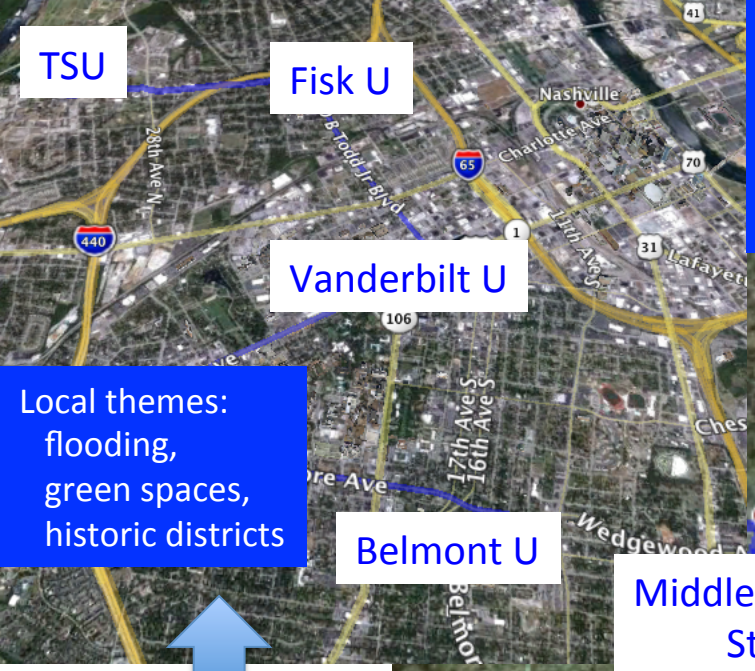
Possible participants in the Middle Tennessee super section of the State of the Planet OOC



TSU

Fisk U

Vanderbilt U

Belmont U

Local themes:
flooding,
green spaces,
historic districts

Cumberland U

Murfreesboro

Middle Tennessee State U

Tennessee

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NASHVILLE CIVIC DESIGN CENTER

NPO, Govt, Academic, Corporate advisors on local and regional issues

U of the South

Regional themes:
water quality,
invasive species,
climate change

Chattanoog

UT, Chat

Image © 2012 TerraMetrics