Social Networks as an Introduction to Computer Science

**Overview**

The HarambeeNet project seeks to bring together educators to build the community necessary to establish alternative introduction to computing centered around the science of networks. The primary means of developing, testing, and disseminating the new model will be via the diverse social and professional networks of the educators that attend the workshops, participate in the faculty learning community, and serve on the advisory board.

We hope this new approach will capture the interest of a broad population of students, crossing gender boundaries. We will develop modules and tools that will be incorporated into existing courses in math, science, computer science, sociology, economics, and related fields. These modules will be developed and evaluated by faculty learning committees based at Duke. The work from these faculty learning communities will be supplemented by educators who will attend workshops at Duke and use a social network model to disseminate the modules to colleagues who will continue to assess and develop them. An advisory board with expertise in computer science and social networks will oversee module development which will ultimately lead to a new paradigm for introducing computer science at a wide variety of schools at all levels.

**Module Course**

- Directed Social Networks: The Six Degrees Project
- Information Security & Cryptography
- Social Networks in the World of Work
- Network Science: Structure, Dynamics, Applications
- Social Network Analysis and Applications
- The Structure of Information Networks
- Network Theory (Sterngal)
- Scaling in Networks (Sterngal)
- Structural-Data Mining (Unnikrishnan)
- Networks (J. Park, Guresu)
- Information Retrieval (McNee)
- Complex Human Networks Reading Group
- Recommender Systems (Virginia Tech)
- Social Networks and Online Communities
- Create Engaging Web Applications Using Metrics and Learning on Facebook (Stanford)
- Computer Networks (Guresu)
- Information Retrieval: Discovery and Delivery (PennState)
- Scaling, Power Laws and Small World Phenomena in Networks (Unnikrishnan)
- Information Retrieval (E.Neider)
- Networks (Cornell)

**Facility Learning Community**

- Jeffrey Forbes
  - Computer Science
- Susan Rodger
  - Computer Science
- David Baume
  - Statistics
- Miguel Lobo
  - Data Science
- James Moody
  - Sociology
- Jonathan Cummings
  - Management

**Advisory Board**

- Ellen Spertus
  - AT&T Labs
- Balachander Krishnamurthy
  - University of North Carolina
- Jennifer Glueck
  - University of Maryland
- Fred Sturman
  - BYU-Idaho College
- Deepak Kumar
  - Business
- Jonathan Cummings
  - Business
- Miguel Lobo
  - Data Science
- James Moody
  - Sociology
- David Baume
  - Statistics
- Susan Rodger
  - Computer Science

**Tools**

Network Analysis & Visualization

Duke GUESS is adapted from GUESS, an exploratory data analysis and visualization tool developed by Eytan Adar. For example, in the Steven Johnson's popular book, Everything Is Good for You. How Today's Popular Culture Is Actually Making Us Smarter, he argues that current television shows have far more complex plots involving more complex social networks than stories in the past. The attached figure shows the Duke GUESS tool visualizing the social network around the show 24's main character Jack Bauer. Students can use GUESS interactively and programmatically ask questions about networks.

Utilizing Networks to Make Recommendations

Duke Scrubber is a set of tools adapted from the AudioScrubber client that enables users to track their music listening habits through an online interface and to find other users with similar tastes and habits. The Duke Scrubber Java client updates a user's listening profile on the Duke Scrubber web site, tracking changes in his or her iTunes library. Using the Duke Scrubber web site, users can find other users who like the same artist, song, or album and track popular songs and artists among the users of the site and their immediate social network on Facebook. Duke Scrubber makes it easy to find people with similar tastes and friend them on Facebook, or use your friends' listening habits to discover new music. The system also generates recommendations with. In classes, students can experiment with different collaborative filtering algorithms to generate recommendations and to determine which system is the most useful to each user's musical tastes.

CoBib is an online bibliographic database for collaborative indexing and annotation of citations. The goal of CoBib is to provide a means for research communities to share and store citations and papers. The system enables users to learn about research through explicit and implicit recommendations. Recommending is accomplished explicitly through direct suggestions to particular people of interest, and implicitly through collaborative filtering algorithms. While an online database cannot supplant sustained interaction with mentors and peers, a system that promotes the community aspect of research may ease students' introduction to research and facilitate various stages of the research process. Students can use CoBib data to explore how collaborative filtering can use the data on how the research communities within a department are structured to produce more effectively recommend new citations to users.

**Sample Assignment: Blog Post**

- You are a student in an upper level computer science course. You have been asked to post a blog entry discussing a research problem. How is the Six Degrees of Kevin Bacon Project relevant to your own research? What is your contribution to the research? Why is the Oracle of Bacon Interesting to us?

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