Announcements Recommendation System
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Abstract
Our proposed project is a recommendations component for web-based announcements system to be used by Cal Poly portal users. The system may hold at any time hundreds of past, present and future announcements or events pulled from disparate sources for display. To facilitate display of announcements, we will develop a recommendation system to select and sort the top announcements for a given user.

1 Introduction
While the announcements system as a whole will be undertaken by ITS, we will design and implement the recommendation component. The announcements system will call the recommendation component, providing a username, and expect in return an ordered list of announcements.

The basic data used by the system will be user attributes, announcement item attributes, and user-generated item feedback.

The subsystem will include several different algorithms for determining item recommendation based on the information outlined in the Data Set section. One algorithm may take in to account only user feedback, while another may use both user and item information. We will evaluate the different algorithms individually as well as in combination. Once the full system has been deployed, the recommendation component can be re-evaluated using real user feedback and the most accurate algorithm or combination chosen.

2 Problem Statement
The entire set of announcements cannot usably be displayed at one time; therefore, a mechanism is needed to suitably determine which announcements should be displayed to a particular user and in what order.

3 Proposed Solution
What we will deliver is a subsystem that, given a user, generates an ordered list of announcements to display to the user.

A traditional recommender system takes a matrix of item scores and users and computes the similarity between ratings in order to recommend announcements to a user. This method has shortcomings:
- Users with no ratings cannot receive recommendations
- Announcements with no ratings cannot be recommended

However, using a recommender system based only on item and user attributes loses the possibility of the system receiving and using feedback from user.
The challenge is to create a recommender system that uses user and event attributes as part of its recommendations in addition to computing similarity between users, without the attribute-based recommendations overshadowing feedback-based recommendations. For example, given a female Mechanical Engineer and using something similar to the C4.5 classification algorithm, it may be that gender is chosen as the first differentiating attribute and the major (Mechanical Engineering) is the second most influential attribute for the item attribute we are looking at. We do not want the item to be ranked low purely on the basis of gender; the fact that the student is a Mechanical Engineer should have a stronger influence on the ranking than gender.

A preliminary list of candidate algorithms is:
- Apriori Algorithm
- Bi-partite Communities
  - Users as hubs, announcements as authorities
- Naïve Bayesian Model
- Support Vector Machine
- Hybrid Algorithms
  - Combining algorithms
- Simple statistical model
  - Primarily for use in evaluation as a baseline

By taking into account not only the attributes of the users and announcements as well as feedback from users on displayed announcements we hope to create a more robust and accurate recommendation system.

4 Data Sets

Data can be separated into different sets: information about users, information about announcements, and user-provided feedback about announcements.

Item attributes will be static information provided at item creation. User attributes will be a sub-set of semi-static portal user data. Some attributes, such as role, major or class year will change, but seldom. Feedback could take two possible forms: binary “interesting” / “not interesting”; or in the cases of events “attending”, “maybe attending”, “not attending”.

Attributes for users and announcements are:

**Users**
- Roles
  - A single user can have multiple roles, but will have one primary
  - Ex.: Student, Faculty, Staff
- Department
  - To which department the faculty, staff, or affiliated user belongs
  - Ex.: Administration, DRC, Health Center
- College
  - To which college the user belongs
  - Ex.: Engineering, Liberal Arts
- Degree
  - Toward what degree type the student is working
- Major / concentration
  - In what major or concentration is the student
  - Ex.: Computer Science, Mechanical Engineering, Child Development
- Age
- Class year
  - In what year at Cal Poly is a student
- Gender
- Club, activity, or group involvement
  - With what academic or extracurricular groups a user is involved
  - Ex.: study abroad programs, DRC, club membership

**Announcements**
- Type
  - Announcement or event
  - Announcement sub-type
  - Ex.: Music, Speech, Social Gathering
  - Event sub-type
  - Ex.: System status, Request for feedback, Campus safety alert
- Publisher
  - Publishing campus organization
- Topics / Tags
  - Each announcement can be tagged with multiple keywords
  - Ex.: Robotics, Viticulture, Sustainability

**6 References**