(300 Words + Figures)

Title: User Exploration of Search Space using Tradeoffs

We describe a system for representing search results as a graph, where the search terms are represented as key nodes. The graph is presented interactively, enabling the user to explore various tradeoffs. This system has many practical applications, and we will share some of those as well.

In the talk itself we will present theoretical arguments for the representation as a graph, and the drawing of that graph. These include optimal placement of result nodes in the graph, smooth change of the representation in response to changes in user preferences, and clustering [1-4]. All these were implemented in a functioning system, using Haskell and a client-side Web interface.

For the sake of a short abstract with a few figures, the easiest way to describe the idea and its merits is to follow an example.
Assume a user wants to select a movie, with the actor Tom Hanks playing in it. In addition, the length of the movie is important, how recent it is, and the genre (comedy or drama). In many current search paradigms, these criteria are entered into the system, and the result is a linear list of results. But the truth is that the user might be willing to compromise on a longer movie as long as it is a comedy, or might be willing to see a drama if it is really a new movie. These represent possible tradeoffs. The series of screenshots below demonstrate the algorithm working on a very small set of cases.

In the talk, we will share a live demo of the system to explore various search spaces.

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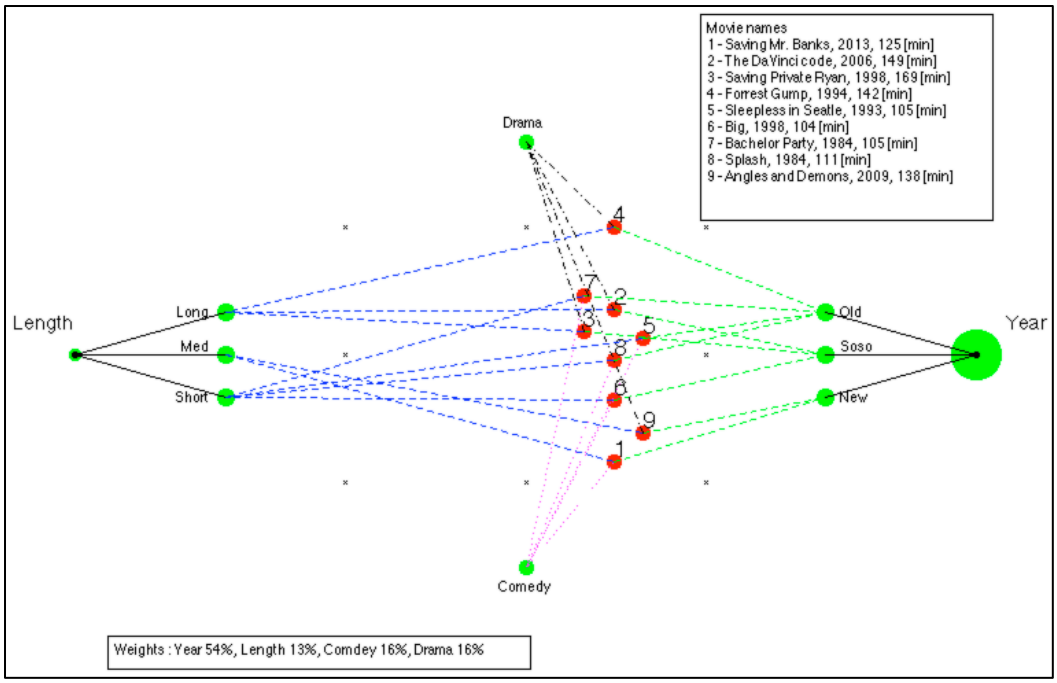
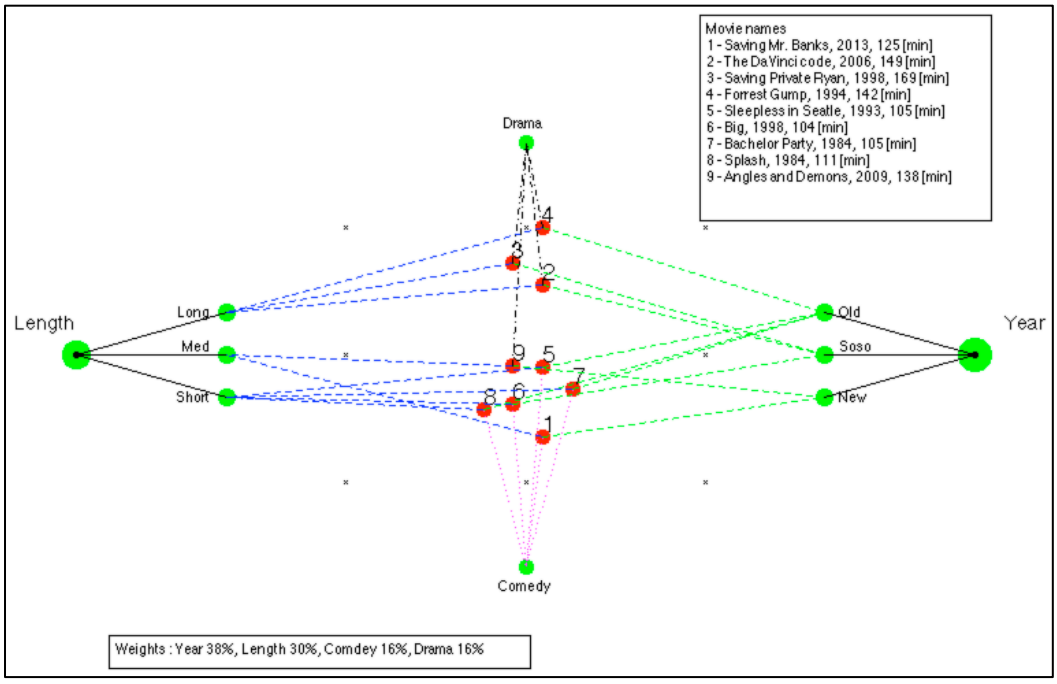
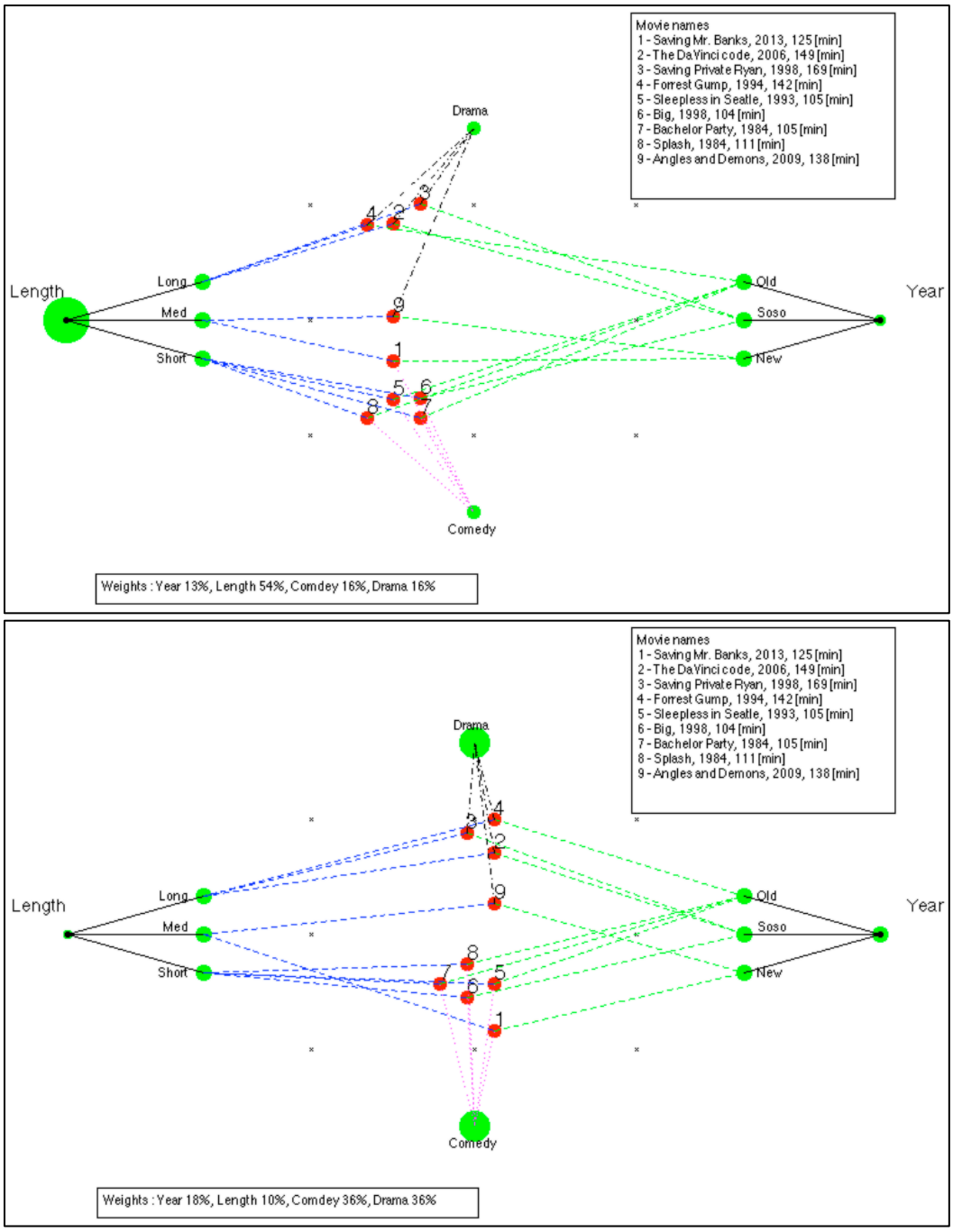
Figures:
The following 4 figures demonstrating different weights on the various keys are screen captures from an early implementation. The first 3 figures demonstrate shifting the emphasis (importance) from the year of the movie to the length of the movie. Note the continuous shift in the clustering of the search results. The 4th figure demonstrates an emphasis on the genre of the movie (comedy or drama), and the resulting representation.

Note: The demo below, composed of a few discrete snapshots, DOES NOT convey well the fact that all locations are computed analytically, and continuous changes in weights cause continuous changes in position. This is an important factor for user perception of the results, and can be seen by the demo or a movie thereof.
In addition, in the actual system, the best results are highlighted, and users can click on each node to get more details.


Movie names
1 - Saving Mr. Banks, 2013, 125 [min]
2 - The DaVinci code, 2006, 149 [min]
3 - Saving Private Ryan, 1998, 169 [min]
4 - Forrest Gump, 1994, 142 [min]
5 - Sleepless in Seattle, 1993, 105 [min]
6 - Big, 1998, 104 [min]
7 - Bachelor Party, 1984, 105 [min]
8 - Splash, 1984, 111 [min]
9 - Angles and Demons, 2009, 138 [min]
Drama
Length
Long
Med
Short
Year
Old
Soso
New
Comedy
Weights : Year 54%, Length 13%, Comdey 16%, Drama 16%


Movie names
1 - Saving Mr. Banks, 2013, 125 [min]
2 - The DaVinci code, 2006, 149 [min]
3 - Saving Private Ryan, 1998, 169 [min]
4 - Forrest Gump, 1994, 142 [min]
5 - Sleepless in Seattle, 1993, 105 [min]
6 - Big, 1998, 104 [min]
7 - Bachelor Party, 1984, 105 [min]
8 - Splash, 1984, 111 [min]
9 - Angles and Demons, 2009, 138 [min]
Drama
Length
Long
Med
Short
Year
Old
Soso
New
Comedy
Weights : Year 38%, Length 30%, Comdey 16%, Drama 16%



References:

There are many references on graphs creation and visualization. Just a sample:
[1] **"Graph Drawing by Stress Majorization"**, Gansner, Koren, and North. AT&T Labs, in 'Lecture Notes in Computer Science', editor János Pach, (3383), 239-250, 2005.

[2] **“GLOs: Graph-level Operations for Exploratory Network Visualization”**, Stolper, Foerster, Minsuk, Zhiyuan, Aakash, and Duen Horng. In “CHI '14 Extended Abstracts on Human Factors in Computing Systems”, ACM, (1375-1380), 2014.
[3] **“Human-assisted graph search: it's okay to ask questions”**, Aditya Parameswaran et. al. In “Proceedings of the VLDB Endowment”, (4) 5, pages 267-278, 2011.
[4] **“Improved optimal and approximate power graph compression for clearer visualisation of dense graphs”**, Dwyer, Mears, Morgan, Niven, Marriott, and Wallace. In “Pacific Visualization Symposium (PacificVis)IEEE”, 105-112, 2014.

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