

The Cinematch System: Operation, Scale Coverage, Accuracy Impact

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What Is Netflix?

- **“Connecting people to the movies they love”**
- **Online DVD movie rental:**
 - **Users subscribe for a fixed fee per month**
 - **Plans define #movies out at once, #turns in a month**
 - **Find, then queue up movies on website**
 - **USPS delivers DVDs within 1 business day most areas**
 - **Keep as long as you want; no late fees**
 - **Return in pre-paid mailer when done**
 - **Next DVD on your queue sent automatically**
- **Working on movie delivery over the net**
- **Choice of 65,000 titles...which ones?**

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Give Ratings

Get Recommendations

The screenshot shows the Netflix interface for the movie 'Shadow of a Doubt' (1943). The page is divided into several sections:

- Header:** Navigation tabs include Browse, Recommendations, Friends, Queue, and Buy DVDs \$5.99+. A search bar is located on the right.
- Movie Details:** The movie title 'Shadow of a Doubt' (1943) is at the top. Below it is a poster image with a red star rating and an 'Add' button. A red circle highlights the poster and the 'Add' button.
- Rating and Details:** Below the poster, there is a rating section with a red circle around the stars and a 'Details' section with a red circle around the 'UR' (Unrated) label.
- Recommendations:** A section titled 'WHY IS THIS RECOMMENDED' lists several movies with star ratings and user avatars. A large red circle highlights this entire section.
- Screen Formats:** A section titled 'Screen Formats' shows 'Full Screen 1.33:1'.
- Subtitles:** A section titled 'Subtitles' shows 'French'.
- Language and Sound:** A section titled 'Language and Sound' shows 'English: Dolby Digital Mono' and 'Spanish: Dolby Digital Mono'.
- Original Release Date:** A section titled 'Original Release Date' shows '1943'.
- Average Rating:** A section titled 'Average of people who rate like you: 4.0 stars' and 'Average of 58,546 ratings: 3.9 stars' is circled in red.
- Reviews:** A section titled 'Reviews' shows two reviews. The first review is by 'ST from IL 4' with a 4-star rating and a red circle around it. The second review is by 'Grizbuh' with a 4-star rating and a red circle around it.

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Show Interest

Get Recommendations

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Browse Home

Other Movies You Might Enjoy

Strangers on a Train
Special Edition

The Man Who Knew Too Much

Rope has been added to your Queue at position 115.
This movie is available now.
[Move To Top Of My Queue](#)

< Continue Browsing Visit your Queue >

Rear Window

Dial M for Murder

Notorious

North by Northwest

Also directed by Alfred Hitchcock:

The 39 Steps

Lifeboat

The Lady Vanishes

Saboteur

Also in Classics:

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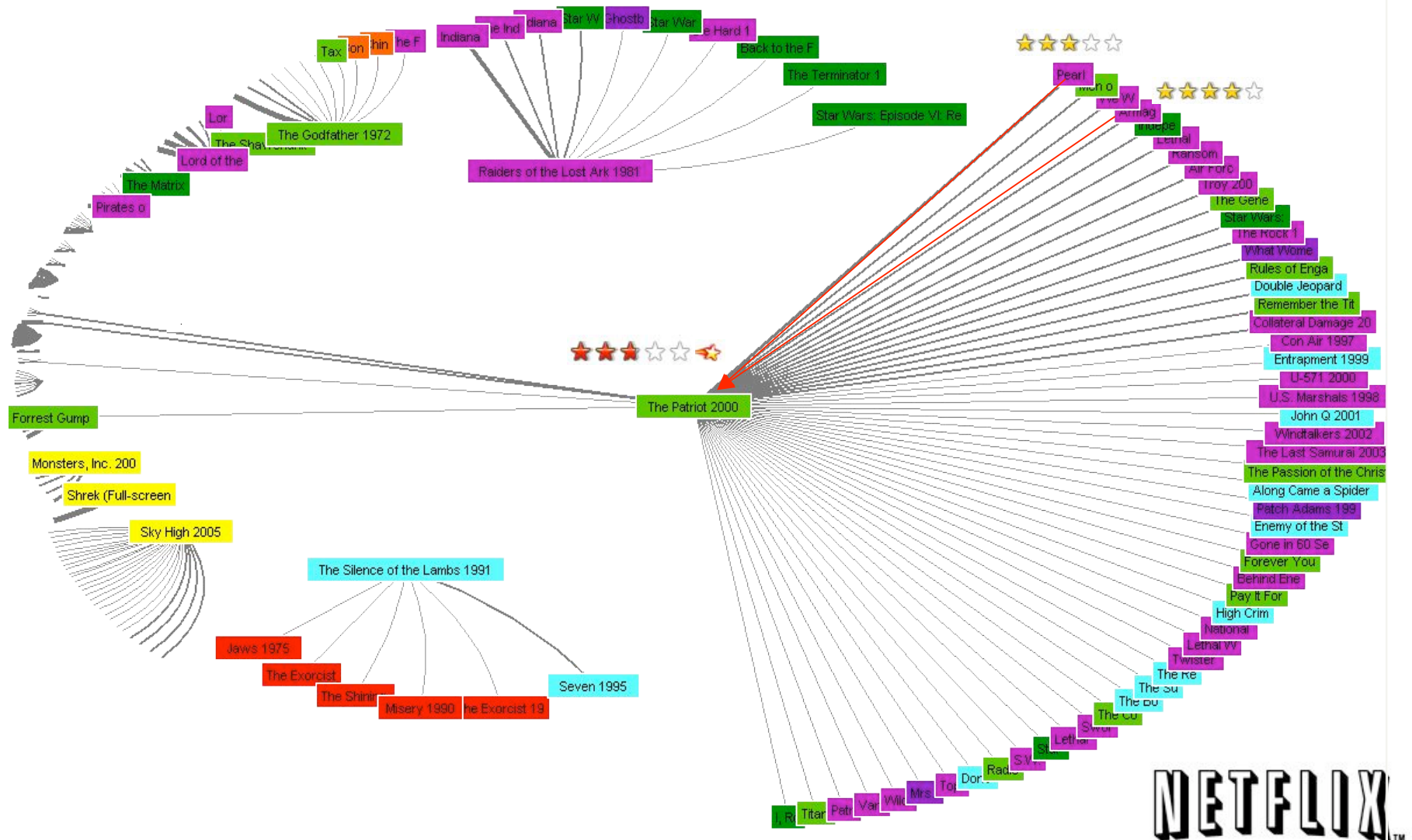
Netflix and Cinematch Scale

- **5M active customers**
 - Ship 1.4M disks per day from 40 locations
- **1.4B ratings since 1997**
 - 2M ratings per day
 - 1B predictions per day
- **Item-to-item analysis with many data-conditioning heuristics**
- **2 days to retrain on new ratings**
- **Manual item setup for “coldstart” titles**
 - Automatically retired

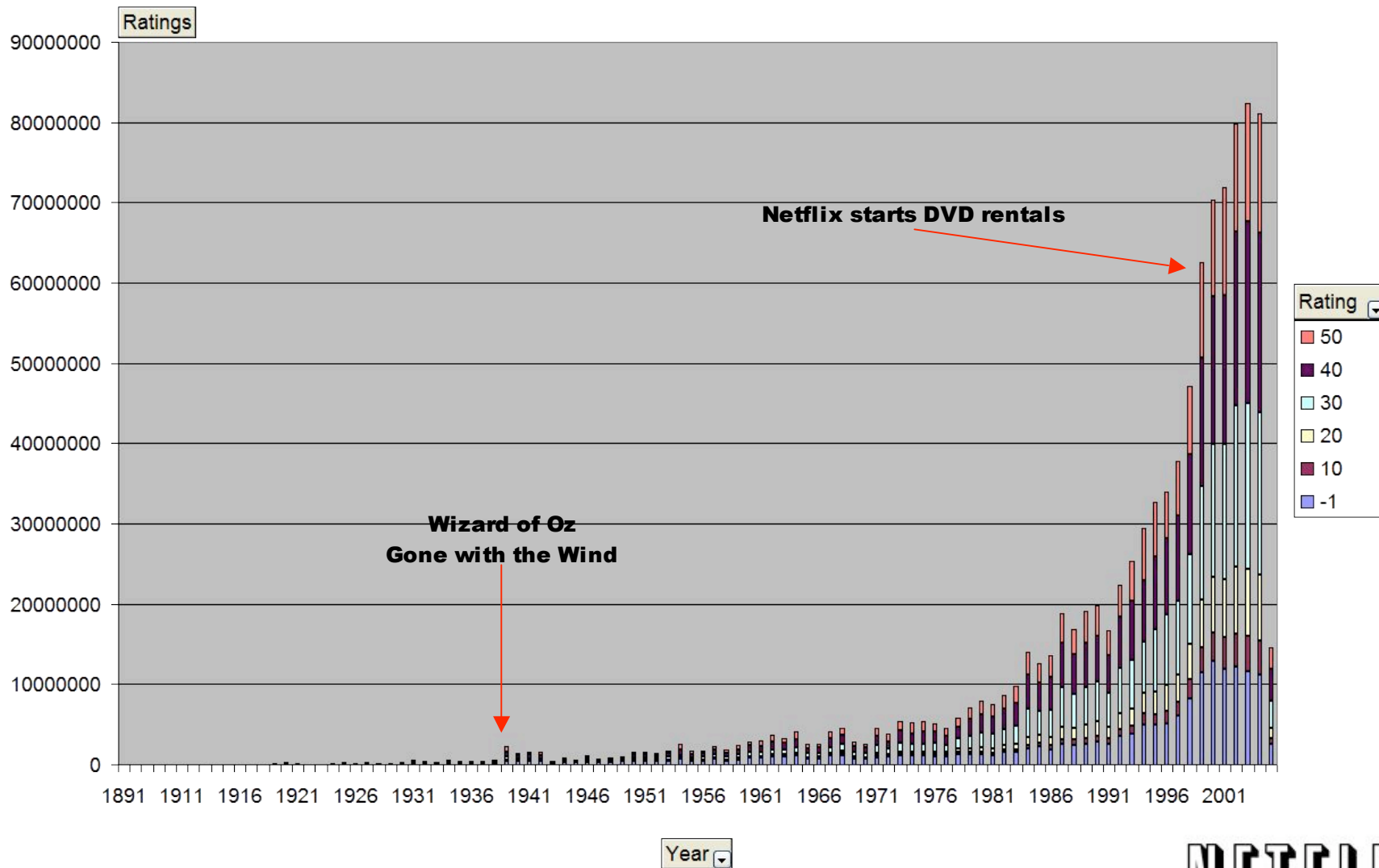
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Cinematch Operation

Predicted/Predictors

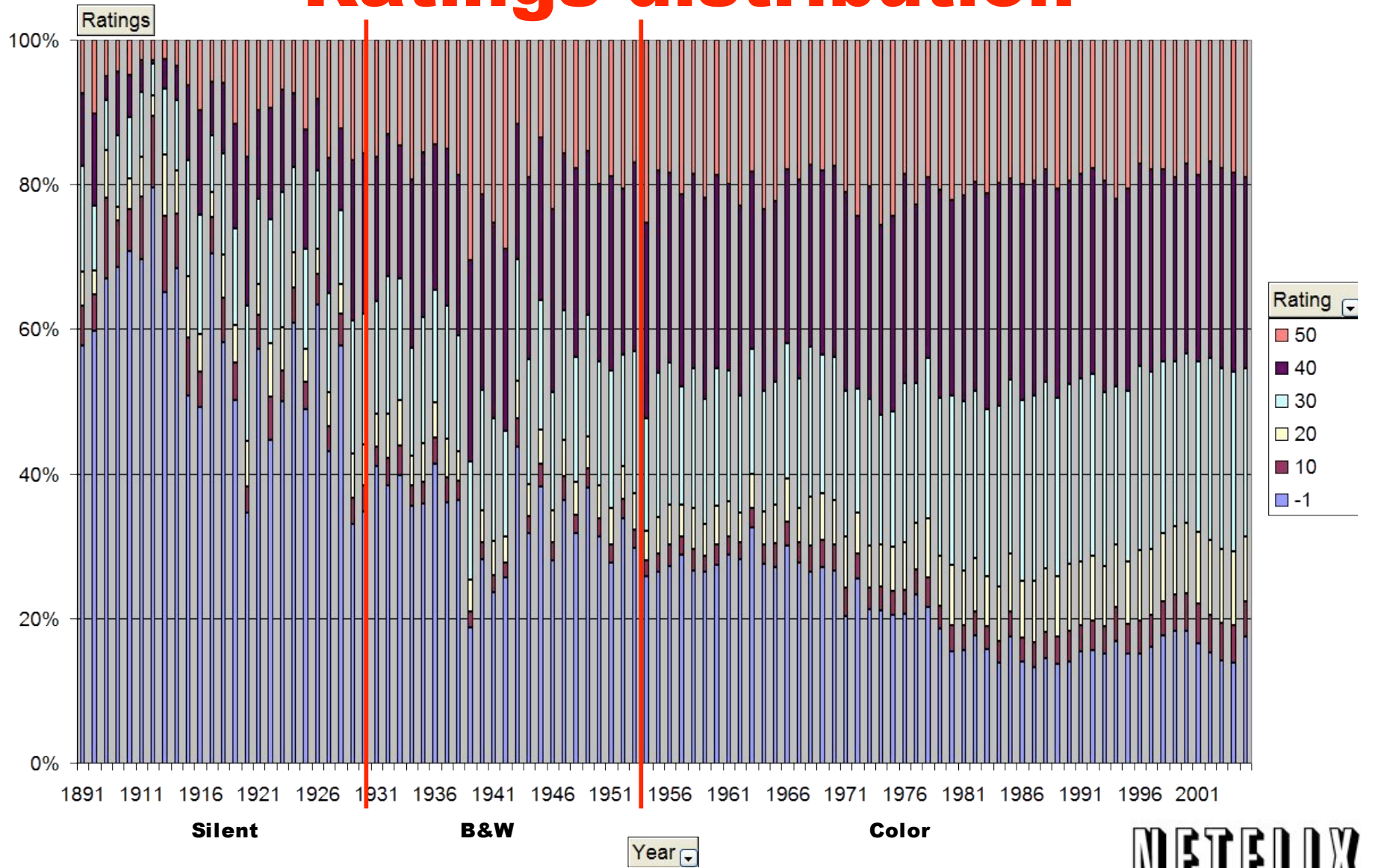


Ratings distribution



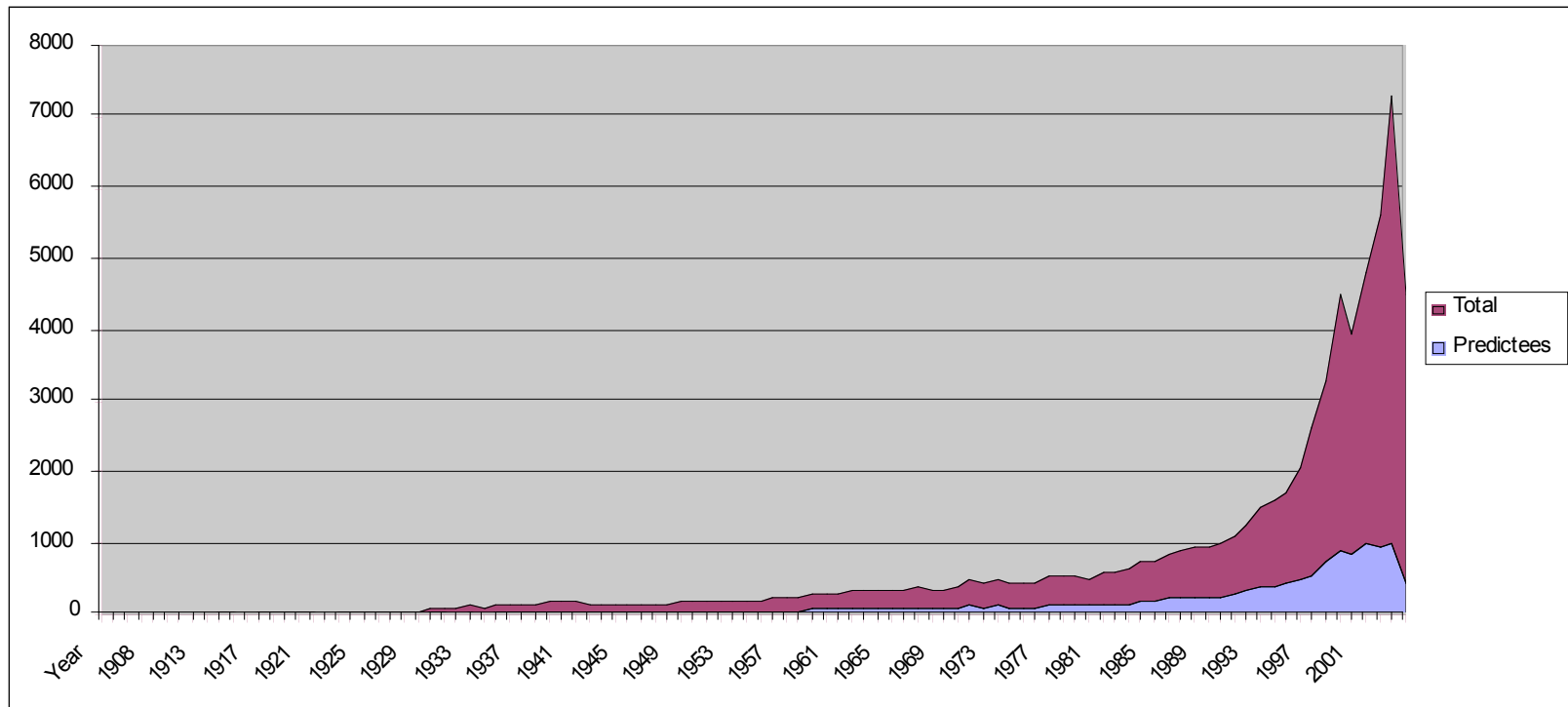
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Ratings distribution



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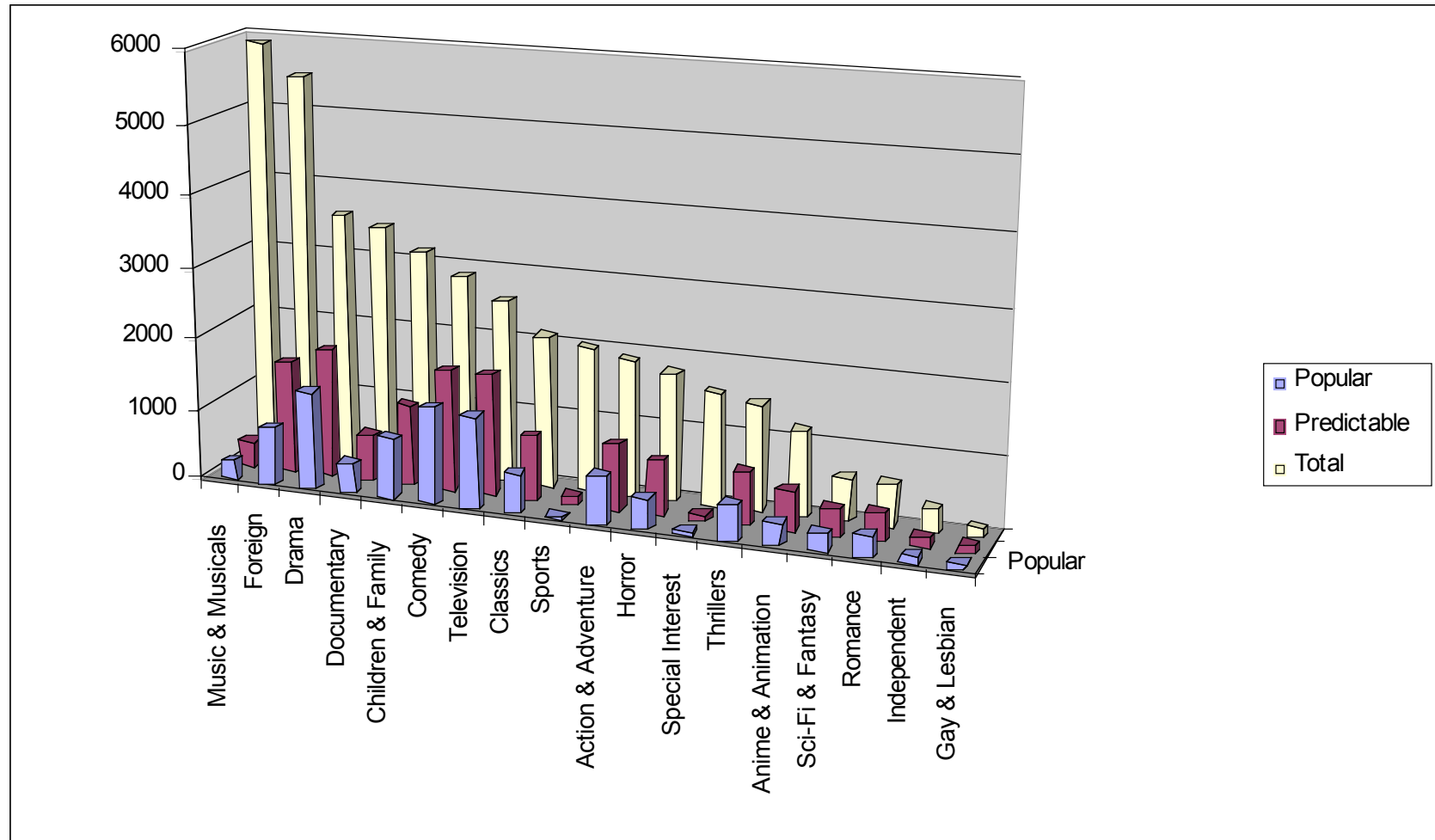
Predictive Coverage



20K predictees (30%)

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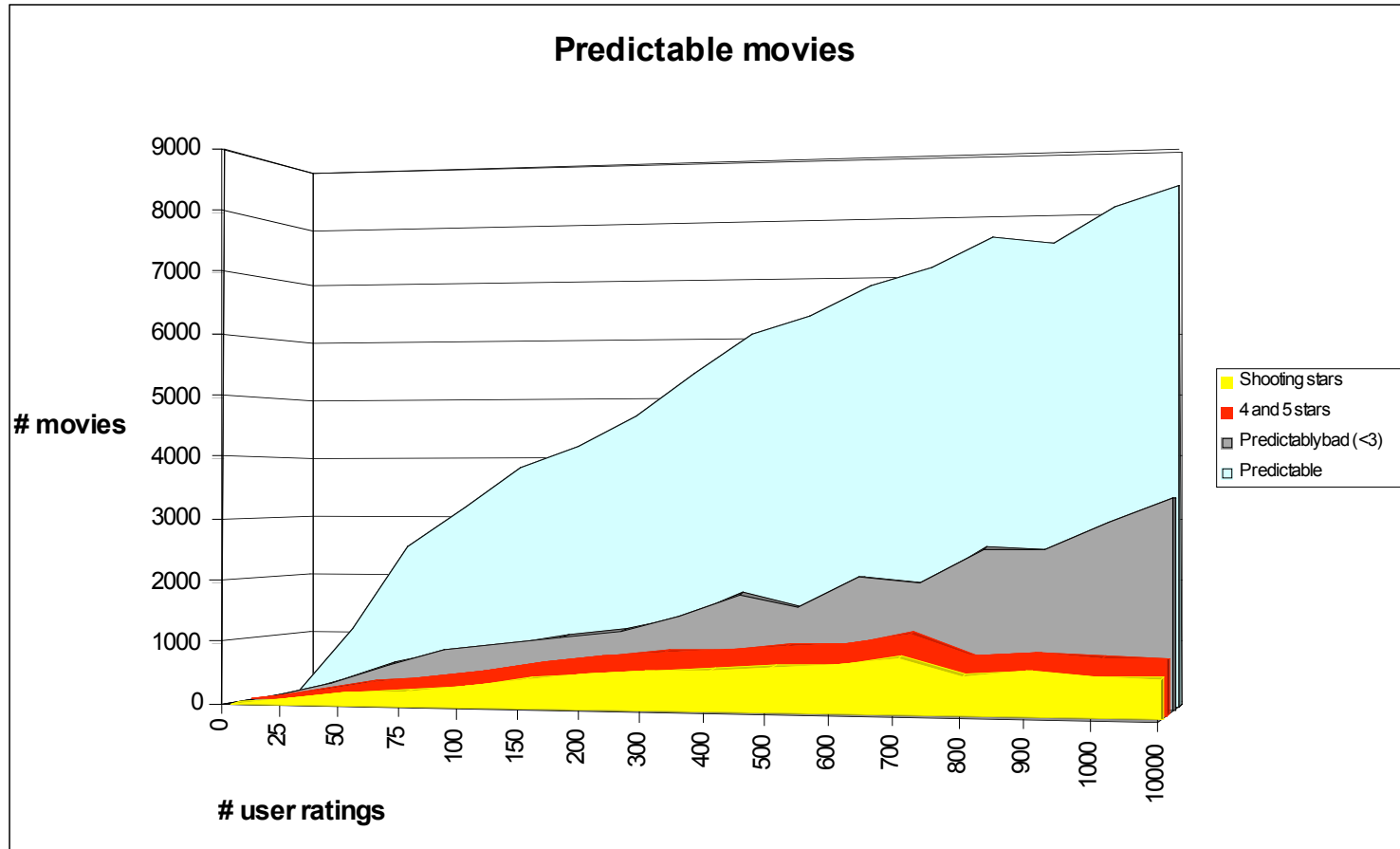
Predictable Films by Genre



* Popular = top 10K by ratings

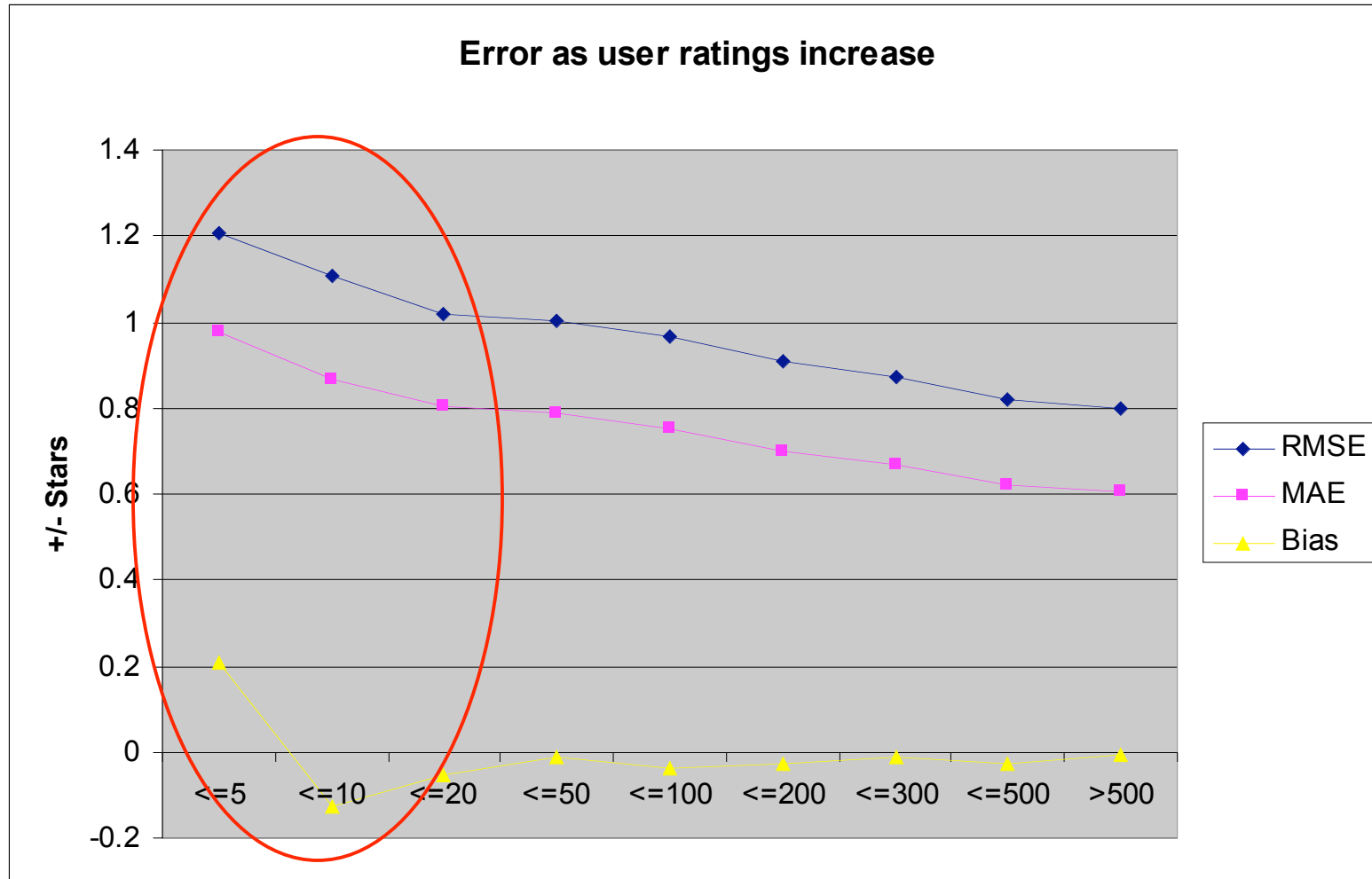
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Climbing Mount Predictable

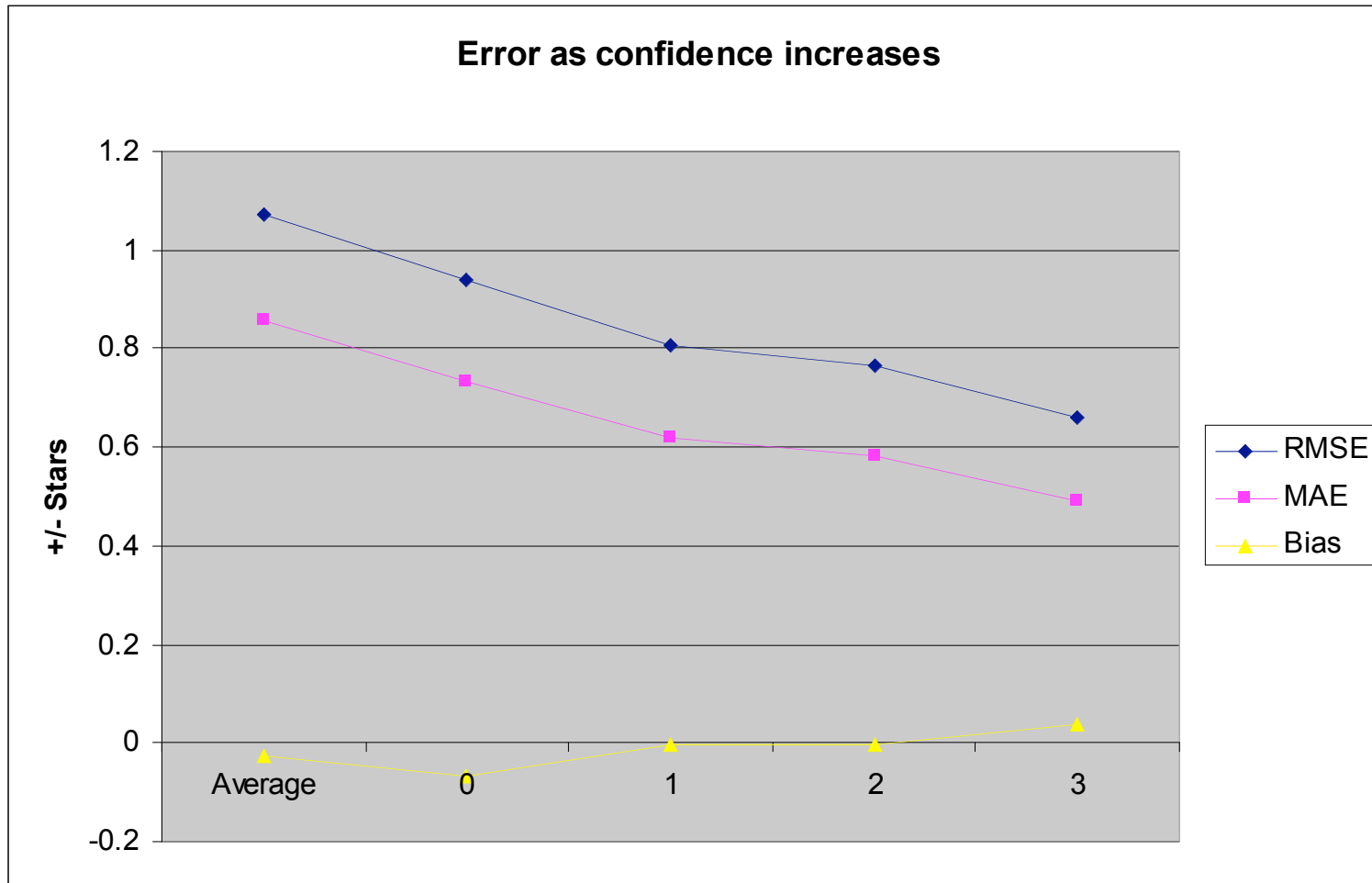


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Prediction Accuracy



Error by Confidence

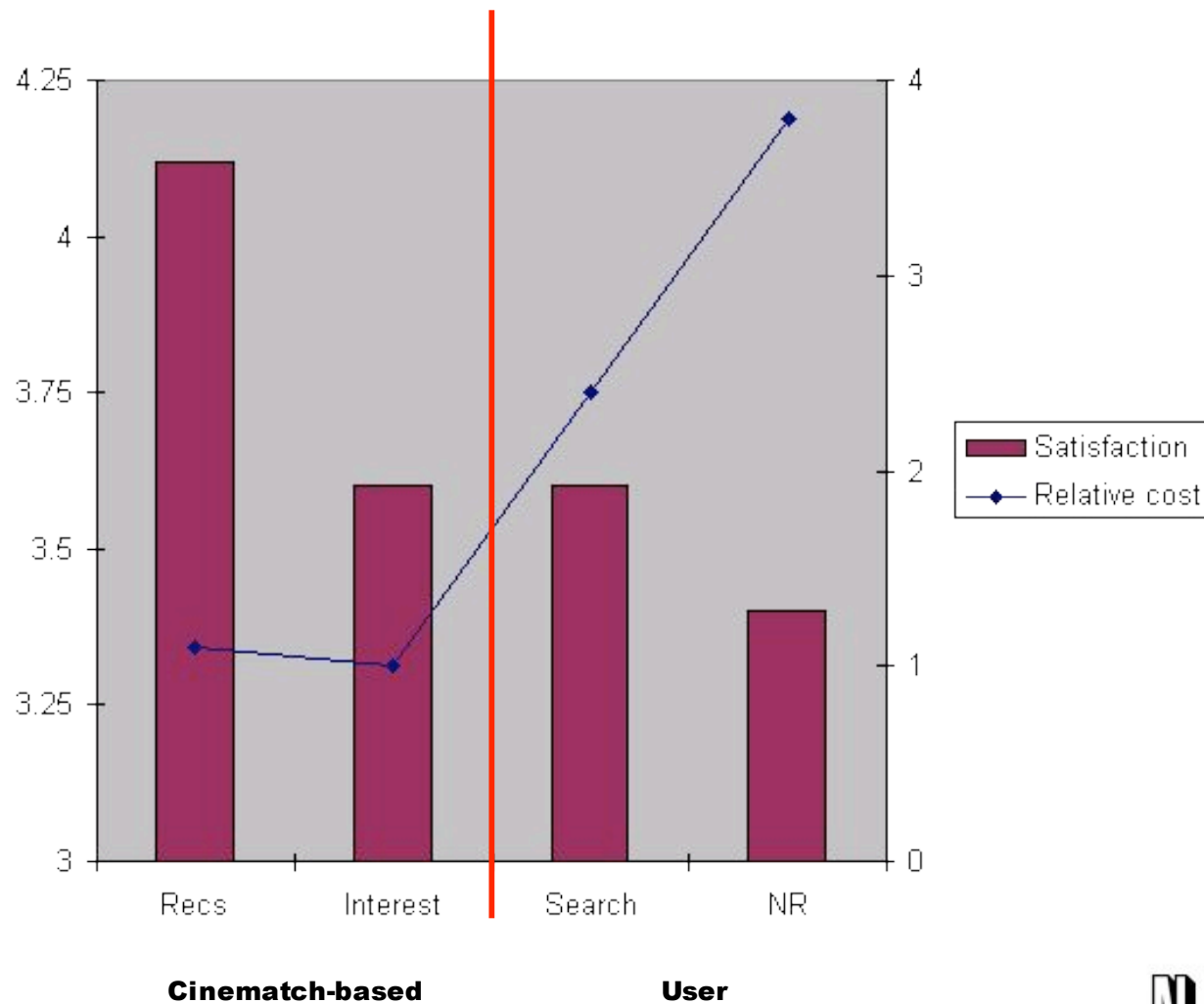


Does It Matter?

- **Absolutely critical to retaining users**
 - **As CM has improved and RMSE has fallen, the percentage of 4-5 star movies rented has increased**
- **Important to users:**
 - **There are only so many new releases**
 - **Help jog memories about movies to see**
 - **CM reflects the collective memory of good movies**



Does It Matter?



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What's Next?

- **Anticipate scale of 20M subscribers in 2010-2012**
 - **Nearly 10B ratings, 10M/day**
 - **5B predictions/day**
- **Improved learning algorithms**
 - **Improve coverage, accuracy and learning speed**
- **Help the non-rater**
- **Explore getting movie tastes beyond ratings**
- **Encode traits of movies that predict emotional response**
- **Motivate a user to take an unknown but likely great movie**

