

Perceptual Relational Attributes: Navigating and Discovering Shared Perspectives from User-Generated Reviews

Manuel Valle, Christoph Lofi, Mengmeng Ye



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ght!

Modelling the video-store clerk: what do we need?

- Users' **perception** of the movie
 - Viewer: “I liked the story, it’s a lovely adaptation of the book”
- Major **consensus** groups in perceptions
 - Some people think it’s nice and slow, while others think it’s a great novel adaptation with a beautiful story
- Use one of the **multiple** shared views to find similar movies
 - Store clerk: “You want something like X with respect to good story and book adaptation, so I think you will love Y”

Challenges:

- Perceptual Features are inherently subjective, different and even contradicting
 - How can we model such a schema?
- There are hundreds of individual perceptions
 - Single-movie representation can't tell the whole story
- Constructing queries for perceptions is difficult, especially if the user doesn't know their target
 - How can we simplify this process?

How to get there:

- Infer customer's perception from available sources
 - Extract representation from social judgements: reviews
- Group similar perceptions together
 - Apply clustering algorithms to inferred representations
- Use Query by Example to find similar movies with respect to a specific perspective
 - Explore iteratively until the user finds the implicit target: “I’ll know it when I see it”

Concepts: From Perception to Perceptual Attributes and Shared Perspectives

- Perception
- Perceptual Attribute
- Perceptual Tuple
- Shared Perspective

★★★★☆ Heartwarming, shocking, and crushingly sad.
 This film will give you a wild emotional ride. It's one of those
 "watch only once" movies. Additionally, it has one of the most
 hate-able antagonists of film history!
 Published 1 month ago by Trev

emotionality, funniness, action, romanticism



9, 0, 5, 8

9, 0, 5, 8

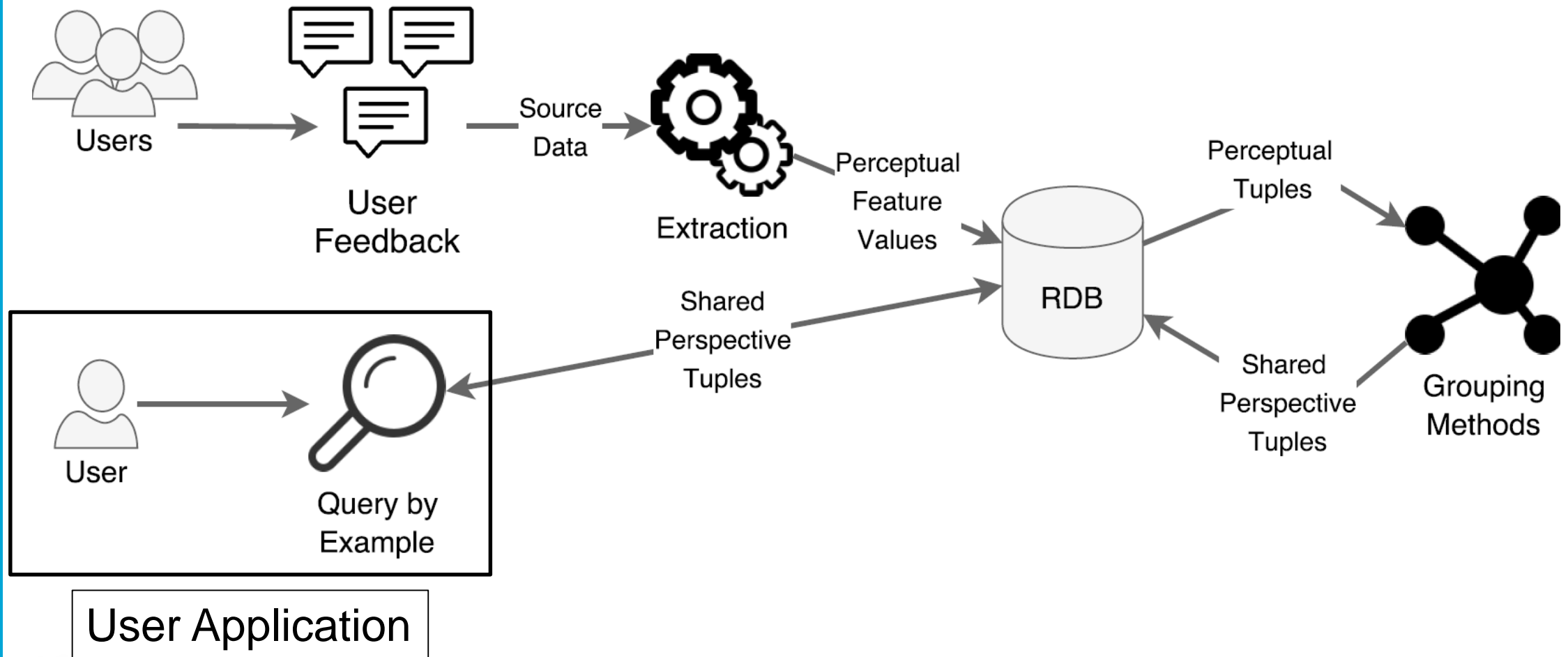
8, 1, 5, 7

10, 0, 4, 9

5, 2, 5, 1

6, 1, 5, 0

5, 0, 4, 1



Social Judgements: Reviews

- Rich perceptions
- Important for online decisions
- Commonly used in research
 - Analysis per item, feature, review
- Our dataset:
 - 375K reviews
 - 2041 movies
 - 100-300 reviews per movie

★★★★★ **Five Stars**
Great movie
Published 9 days ago by James Wolf

★★★★★ **Five Stars**
One of the few movies that's better than the book
Published 13 days ago by dstroyer71

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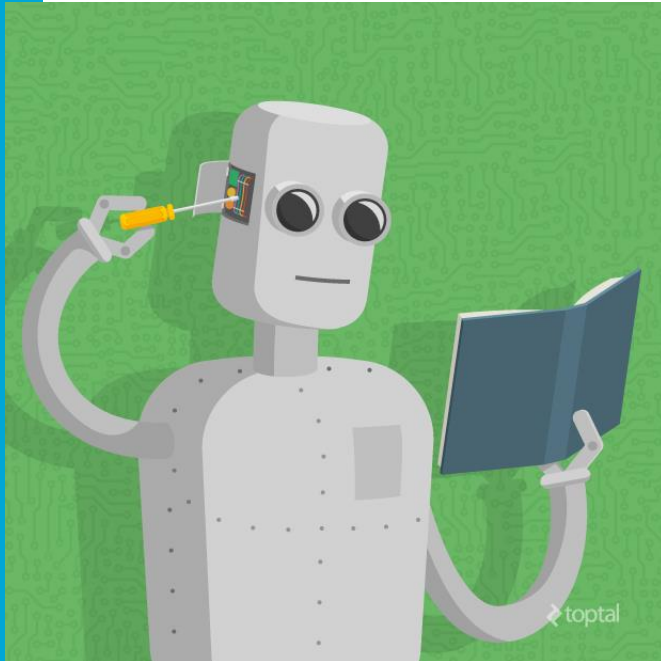
The Amazon logo, featuring the word "amazon" in a bold, lowercase, black sans-serif font. Below the text is a curved orange arrow that starts under the letter 'a' and points towards the letter 'z'.

A Phenomenal Movie! A great buy with prime as well!
Published 29 days ago by Darnell and Crista Hines

★★★★☆ **Heartwarming, shocking, and crushingly sad.**
This film will give you a wild emotional ride. It's one of those "watch only once" movies. Additionally, it has one of the most hate-able antagonists of film history!
Published 1 month ago by Trev

★★★☆☆ **Three Stars**
The movie have stop playing mid way this is two movie.
Published 1 month ago by Amazon Customer

Perceptual Attributes: Modelling



Ok, so it did not deserve best picture. It was still excellent. It has great performances in it. Particularly the guy who never was very famous Michael Jeter or whatever his name is. I love the visuals. I cried at the end. Michael Clarke Duncan is great.

Perceptual Attributes - *Explicit vs Implicit*

Acting: 3.43/5

Directing: None

Scenery: 3.12/5

Character: 3.43/5

Storyline: None

Ok, so it did not deserve best picture. It was still excellent. It has **great performances** in it.

Particularly the guy who never was very famous

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Directing: None

Scenery: 3.12/5

Character: 3.43/5

Storyline: None

Ok, so it did not deserve
Modelling perceptual
attributes is hard!

- Subjective
- Usually contradictory
- Constantly changing

I love the visuals. I cried
at the end. Michael
Clarke Duncan is great.

Movie Modelling Experiment

- 180 second year university BSc students (in pairs)
- Create a ranked list of **perceptual attributes** for movies – *What is IMDB missing?*
- Results:
 - 6.5 average attributes per team (min 4 – max 10)
 - 74 teams mentioned “storyline”
 - 72 mentioned “acting”
 - Roughly 50% “scenery”, “character”, or “directing”

Movie Modelling Experiment

- 180 second year university BSc students (in pairs)
- Create a ranked list of perceptual attributes for movies – *What is IMDB missing?*
- Results:
 - 6.5 average att 4 – max 10)
 - 74 teams ment
 - 72 mentioned **Lots of complaints**
 - Roughly 50% ‘ or “directing”

Perceptual Attributes - Explicit vs *Implicit*

Ok, so it did not deserve
 Ok, so it did not deserve
 best picture. It was still
 excellent. It was great
 Ok, so it did not deserve
 exceptional. It was great.
 best picture. It was still
 particularly the guy who
 excellent. It has great
 performances in it.
 never was very famous
 Particularly the guy who
 whatever his name is. I
 never was very famous
 whatever his name is. I
 Michael Jeter. Michael
 whatever his name is. I
 loved the visuals. I cried
 at the end. Michael

d_0: 0.00548

d_1: -1.02489

...

d_98: 0.58937

d_99: 1.25607

Perceptual Attributes - Explicit vs *Implicit*

- Hundreds of perceptions
- Implicit values have no meaning for humans
- Impossible to query

d_0: 0.00548

d_1: -1.02489

...

d_98: 0.58937

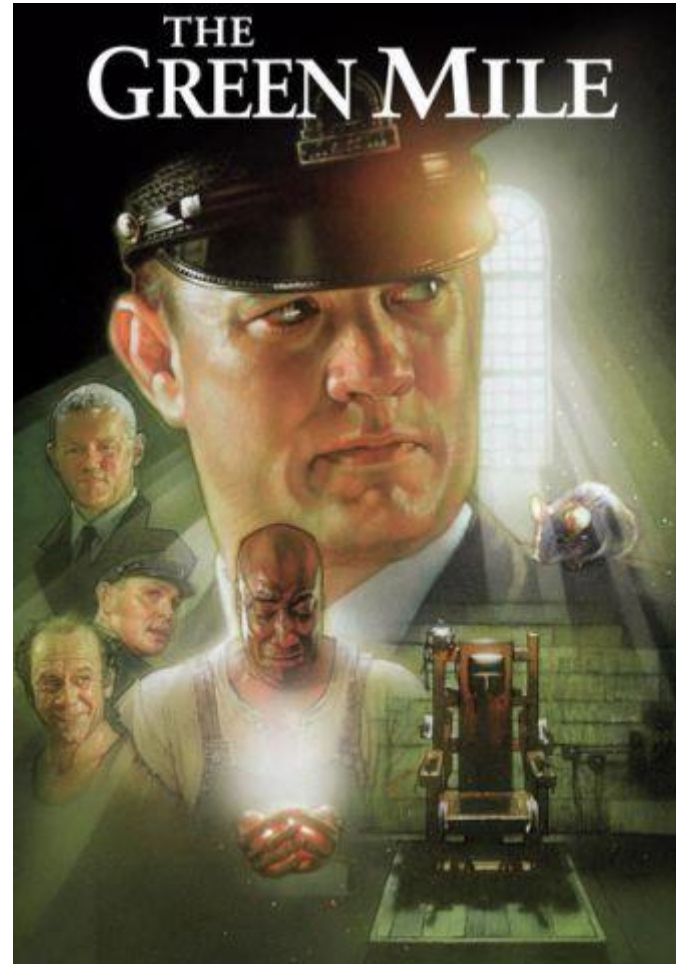
d_99: 1.25607

Michael Jordan is Michael
 love at the end. Michael
 whatever his name is, I
 Clarke Dunbar is great.
 love the visuals. I cried
 Clarke Dunbar is great.
 at the end. Michael

Constructing Shared Perspectives

- Current - Single representation, seems counterintuitive
 - Twilight: powerful romance or shame to vampires?
- Proposal - Group together similar perceptions = with similar *perceptual tuples*
 - Twilight: Why not both?
- Algorithm that can leverage similarity between Perceptual Tuples to create groups, use centers
 - Cool...still un-queryable





Explore titles related to:
The Green Mile



Selected Movie



Official movie overview

A supernatural tale set on death row in a Southern prison, where gentle giant John Coffey possesses the mysterious power to heal people's ailments. When the cellblock's head guard, Paul Edgecomb, recognizes Coffey's miraculous gift, he tries desperately to help stave off the condemned man's execution.

Select next movie below

Perspective 1

The other fantastic prison movie. (The first one being The Shawshank Redemption). This one is a little more magical and very touching. Do not miss it!



1



2



3

Perspective 2

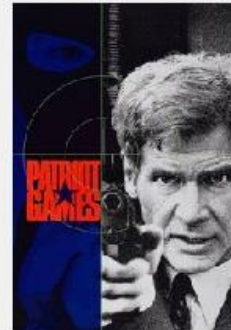
As always a super good movie. We watch this one every few years. Acting is superb by all in this picture with a really good story. The book is really good too and the movie follows it quite well.



4



5



6

Perspective 3

This is a very good movie. Tom Hanks is great as always and Michael Clark Duncan is just as good! The movie is a bit long but it's so good it keeps you into the movie thus you don't really mind the time length of the film. Hanks supervises Death Row in the 20's and meets John









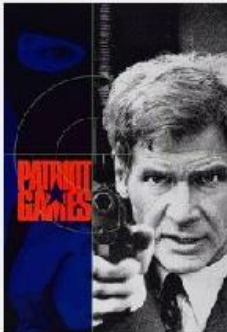



7



8

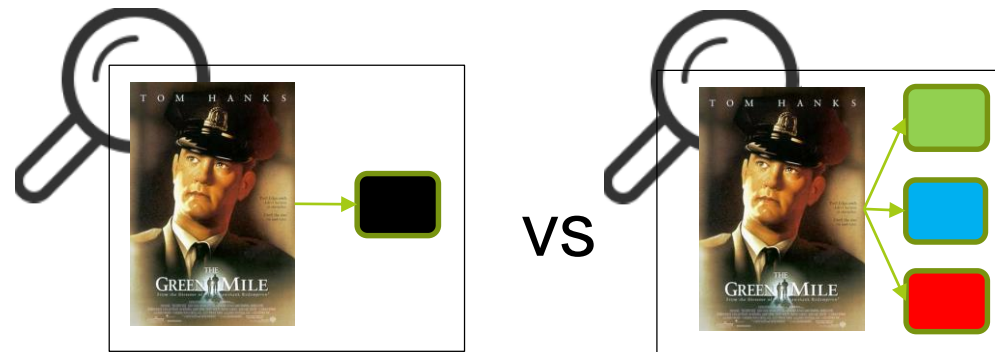


9

| Selected Movie | Perspective 1 | Perspective 2 | Perspective 3 |
|---|---|---|---|
|  <p>Official movie overview</p> <p>A supernatural tale set on death row in a Southern prison, where gentle giant John Coffey possesses the mysterious power to heal people's ailments. When the cellblock's head guard, Paul Edgecomb, recognizes Coffey's miraculous gift, he tries desperately to help stave off the condemned man's execution.</p> <p>Select next movie below</p> <div> <input type="text" value="1"/> </div> <div> <input type="button" value="Next Set"/> </div> | <div style="background-color: #90EE90; padding: 5px; text-align: center;"> <p>Emotional and touching</p> </div> <div>  <p>1</p> </div> <div>  <p>2</p> </div> <div>  <p>3</p> </div> | <div style="background-color: #00B0F0; padding: 5px; text-align: center;"> <p>Great acting, good story from book</p> </div> <div>  <p>4</p> </div> <div>  <p>5</p> </div> <div>  <p>6</p> </div> | <div style="background-color: #FF0000; padding: 5px; text-align: center;"> <p>Long but worth it, good actors</p> </div> <div>  <p>7</p> </div> <div>  <p>8</p> </div> <div>  <p>9</p> </div> |

Evaluation: Performance

- Can Shared Perspectives improve the query process of items with Perceptual Attributes?
 - Simulate User Interaction with Current Similarity Search vs Shared Perspectives



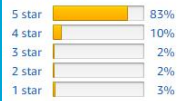
Current: Single Representation



Customer reviews

★★★★★ 1,590

4.8 out of 5 stars

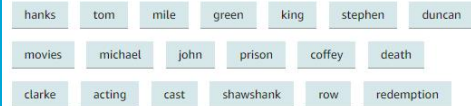


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Write a customer review

See all 1,590 customer reviews

Read reviews that mention



Top customer reviews

JJillinoisRN Top Contributor: Camping

★★★★★ Recent classic

August 9, 2015

Format: DVD | Verified Purchase

Great film about seeing past the superficial aspects of someone, and their perceived shortcomings/faults, and finding the true strength of their heart. Also touches on the egocentricity of someone with new "power" and a connection to real power, and how cruelty combined with that makes for a dangerous combination- and beautiful karma. I always get more out of this film each time I see it. Great ensemble cast.

Comment | 2 people found this helpful. Was this review helpful to you? Report abuse

JJCEO #1 HALL OF FAME TOP 10 REVIEWER

★★★★★ One of the best Stephen King films!

February 28, 2012

Format: DVD | Verified Purchase

Paul Edgecomb (Tom Hanks) is the head guard on death row. It is called the Green Mile by those at the prison because of the green floor that convicted men must walk to the electric chair. John Coffey (Michael Clarke Duncan) is convicted in court for the murder of two little girls. He is a giant of a man and everybody believes that he must have done it but Paul begins to wonder if it is true.

Customer images



See all customer images

Most recent customer reviews

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Great movie

Published 9 days ago by James Wolf

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★★★★☆ Four Stars

Good movie...!!

Published 26 days ago by MADCLOWN6000

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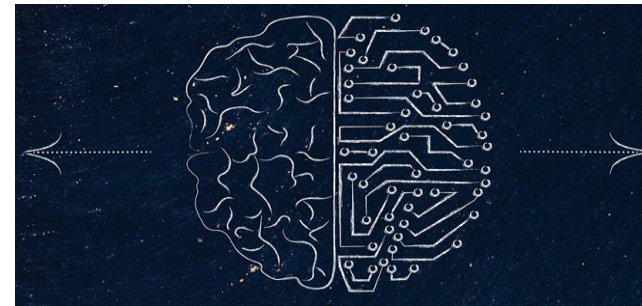
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Published 1 month ago by Trev

★★★★☆ Three Stars

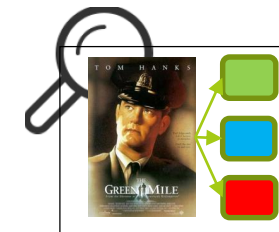
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Published 1 month ago by Amazon Customer



Acclaimed
prison movie
with Tom
Hanks that
everyone
should watch

Proposed: Shared Perspectives



Customer reviews

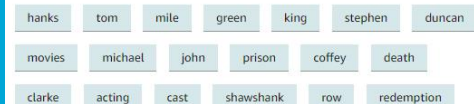


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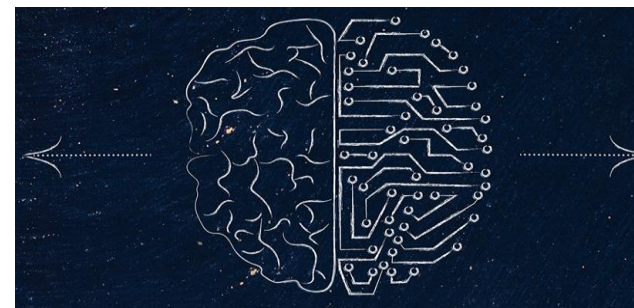
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Emotional and touching movie

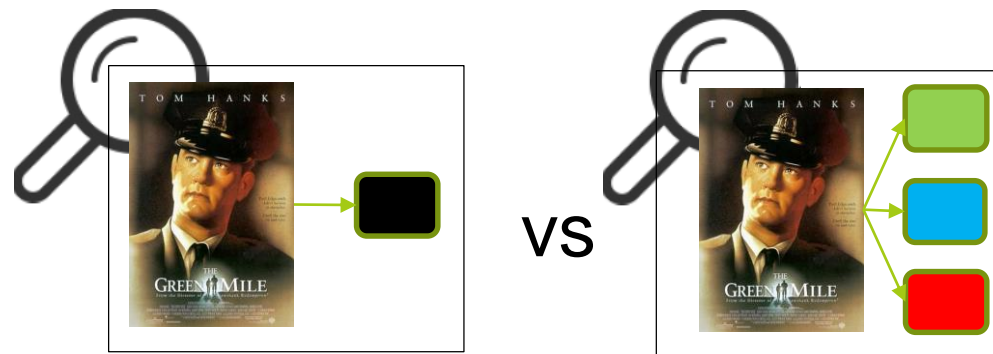
Great acting with good story from a book

Long but worth it, great movie w/ good actors

Evaluation: Performance

- Can Shared Perspectives improve the query process of items with Perceptual Attributes?
 - Evaluate: Simulate User with Current vs Proposed System (not SQL queries or Recommendation)
 - Metric: Query Iterations from Starting movie to Target movie (the only user input)
 - Challenge: Subjectivity, how to define movie pairs?

Evaluation: Performance

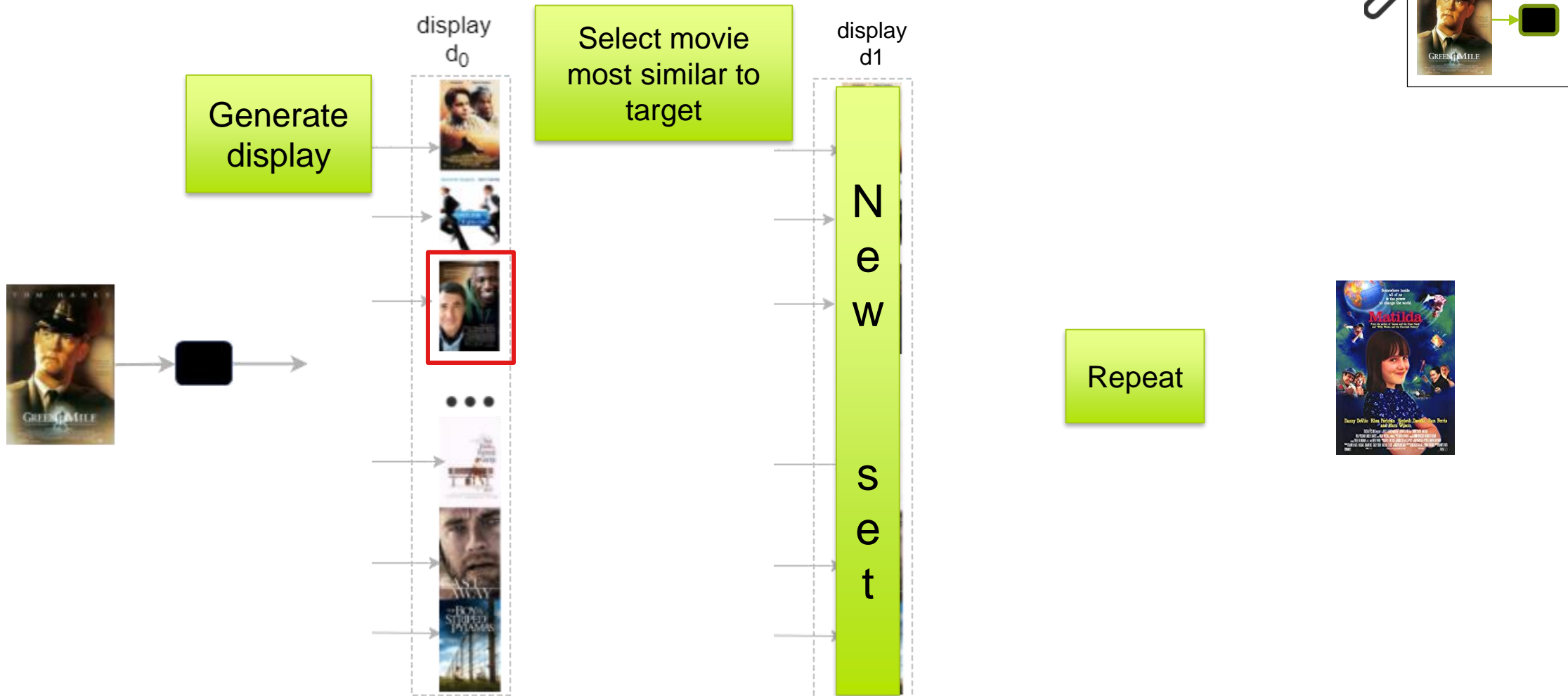


- Simulated QBE User Behavior
 - Predefined, random pairs of start and target movie
 - Count the query iterations
 - In average, SPs should outperform SR

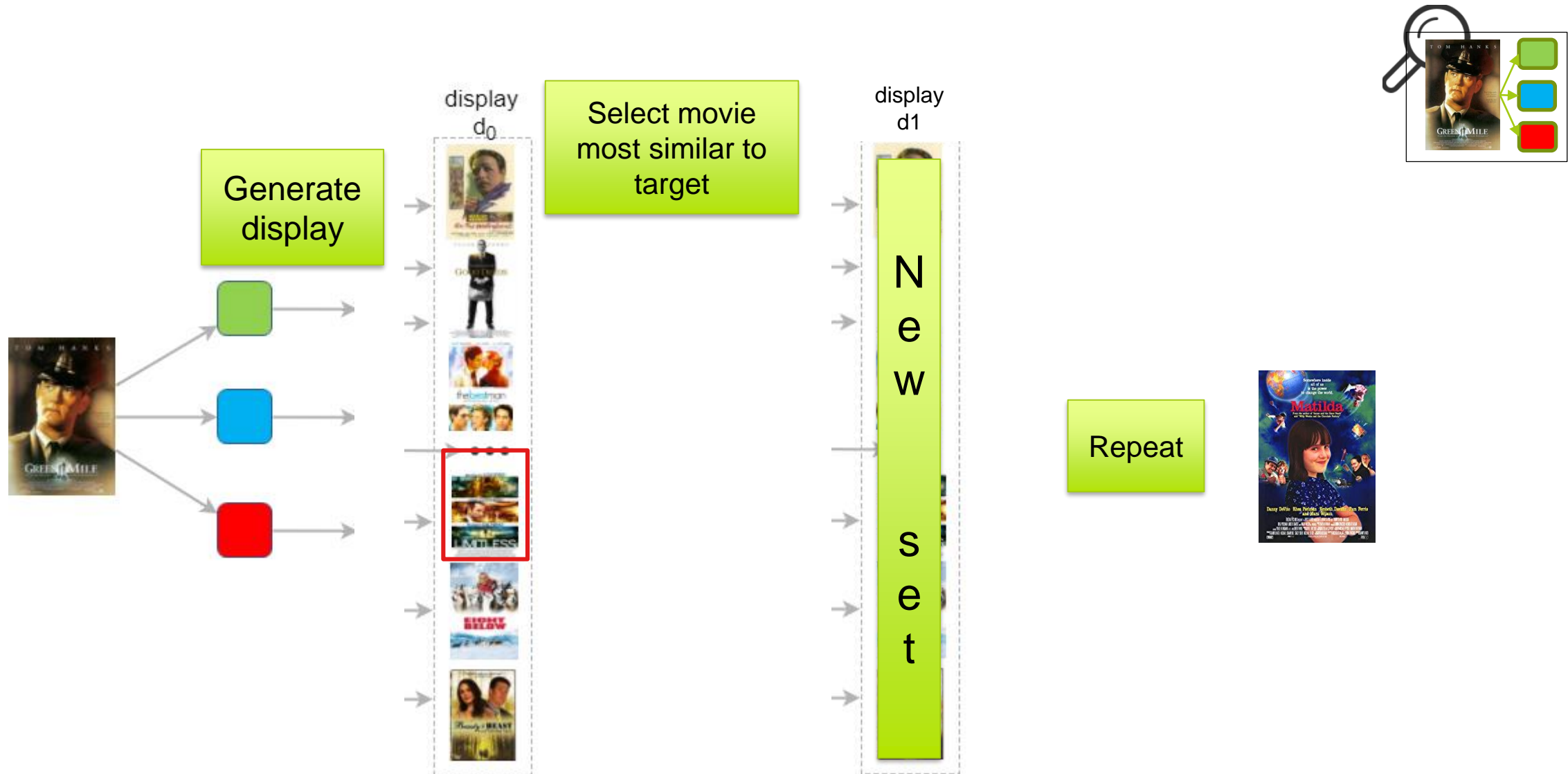
Simulated User



Simulated User: Single Representation



Simulated User: Shared Perspectives



Results – 100 Pairs



| Pairs | Single Representation | Shared Perspectives |
|-------|-----------------------|---------------------|
| 100 | 40.58 | 32.54 |

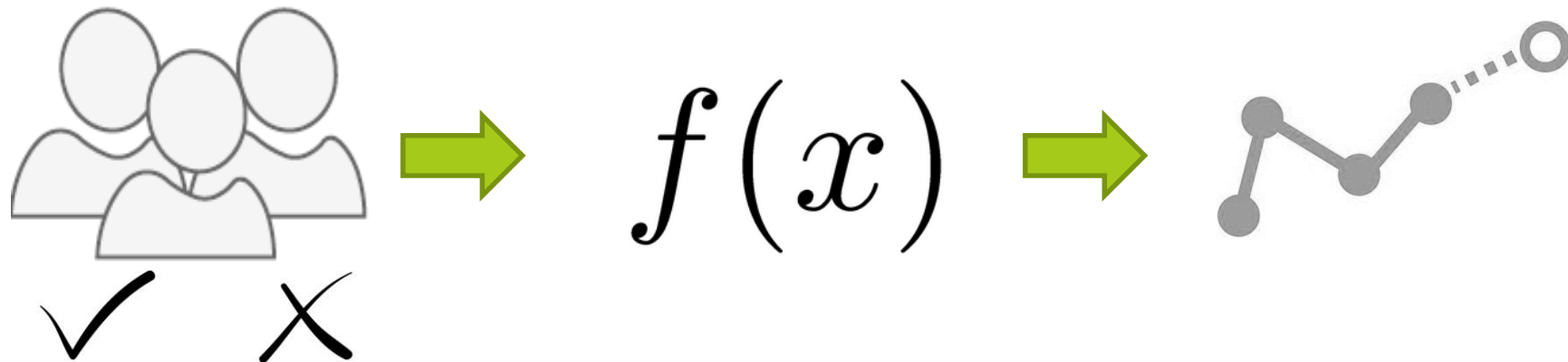
- In average, 30% fewer steps from start to target item using Shared Perspectives
- Main issue, pairs with many iterations (up to 200)

Qualitative Analysis

- 2 steps from romantic comedy to sci-fi because of “unexpected good acting, refreshing to the genre” ✓
- 96 steps from horror to musical because “it looks better on Blu-ray than VHS” ✗
- 200 steps from drama/comedy to romantic comedy ✗ because all SP of target “looked good but it’s just alright”


Evaluation: Semantic Quality

1. Ask users to rate some SPs to obtain their Usefulness Scores
2. Model this Score as a function of available data
3. Predict the Score of all SPs and Evaluate in Simulation



Usefulness Score: Asking Users

Selected Movie



Have you seen the movie?
Yes

Official movie overview

After a threat from the tiger Shere Khan forces him to flee the jungle, a man-cub named Mowgli embarks on a journey of self discovery with the help of panther, Bagheera, and free spirited bear, Baloo.

Next Set

Perspective 1

Review of Perspective 1 for the selected movie

Do you agree that these 3 movies are related to the selected movie, given the review above?

Totally Agree

If you could name this perspective by the elements the reviews have in common, how would you call it?

the aladdin vhs tape perfect just new everyone in my house love the movie and wanted it so much on VHS even had to buy another VCR thanks a lot!

This review seems related enough to the review of the selected movie for this perspective

Both of my kids(son & daughter) enjoyed this movie. I would of bought the blu ray, DVD and Digital copy if they had one, but apparently they do not.

This review seems related enough to the review of the selected movie for this perspective

My family loves to watch this movie at Christmas tme and I wanted to replace my VHS copy with a DVD copy. I was so happy to find it for a great price on Amazon.

This review seems related enough to the review of the selected movie for this perspective

Perspective 2

Review of Perspective 2 for the selected movie

Do you agree that these 3 movies are related to the selected movie, given the review above?

Totally Agree

If you could name this perspective by the elements the reviews have in common, how would you call it?

Hercules is one of my favorite Disney movies, and one I enjoy watching for the story and the songs. I am happy to own it in my collection. :)

This review seems related enough to the review of the selected movie for this perspective

Always enjoy watching "The Duke", but this is one of my favorites. One of the few movieshe made with young boys and making them into cowboys!

This review seems related enough to the review of the selected movie for this perspective

This movie is a great story for young children and the music is fantastic (Phil Collins). It is one of the favorites in the DVD library!

This review seems related enough to the review of the selected movie for this perspective

Perspective 3

Review of Perspective 3 for the selected movie

Do you agree that these 3 movies are related to the selected movie, given the review above?

Totally Agree

If you could name this perspective by the elements the reviews have in common, how would you call it?

WE highly recommend all the Muppet Movies for all ages. We love them and always have. Our kids grew up watching these and we still do.

This review seems related enough to the review of the selected movie for this perspective

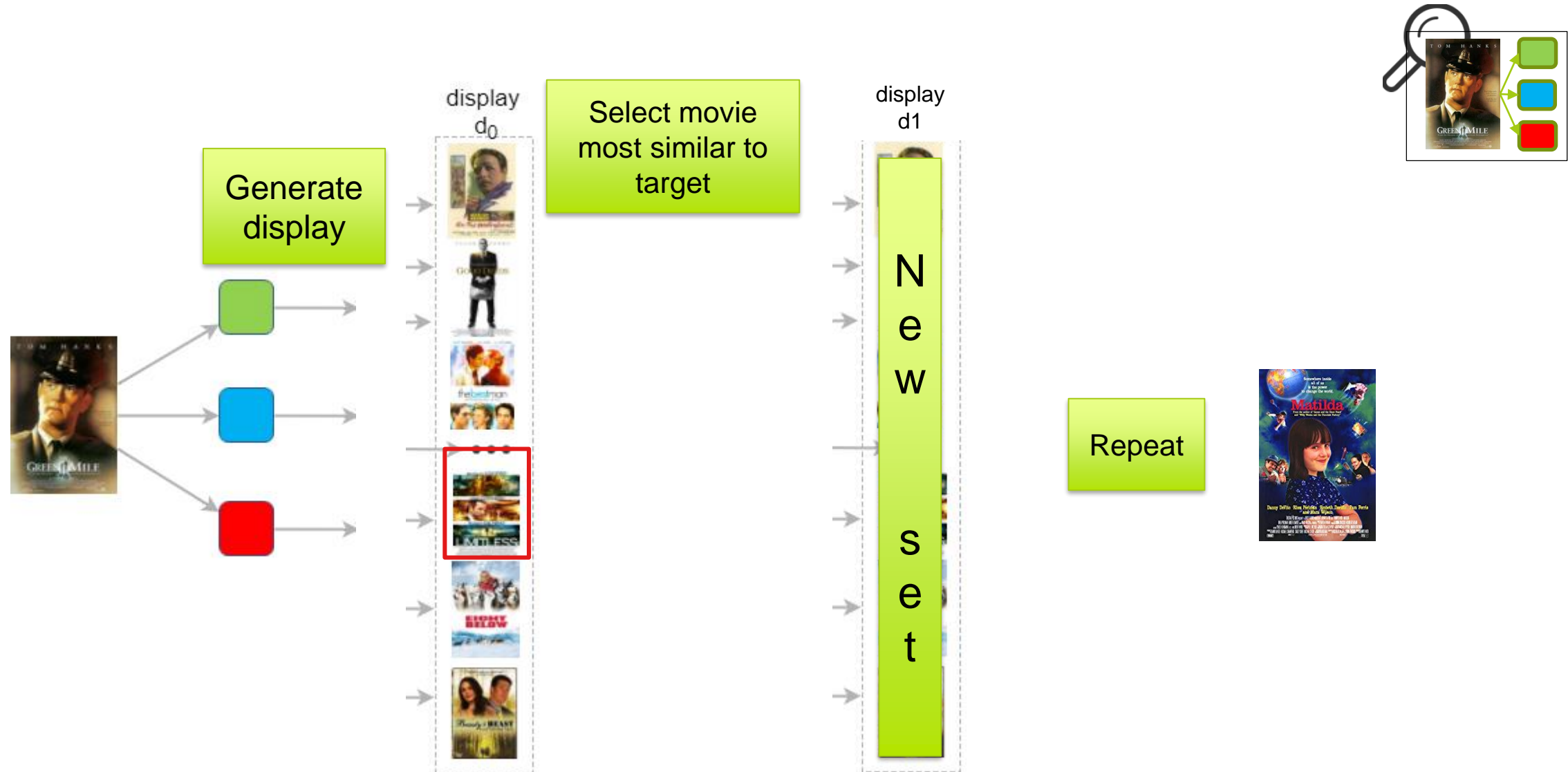
My kids and I used to watch this movie all the time and now I can enjoy it with my grandkids. This is a really great family movie. We all love it.

This review seems related enough to the review of the selected movie for this perspective

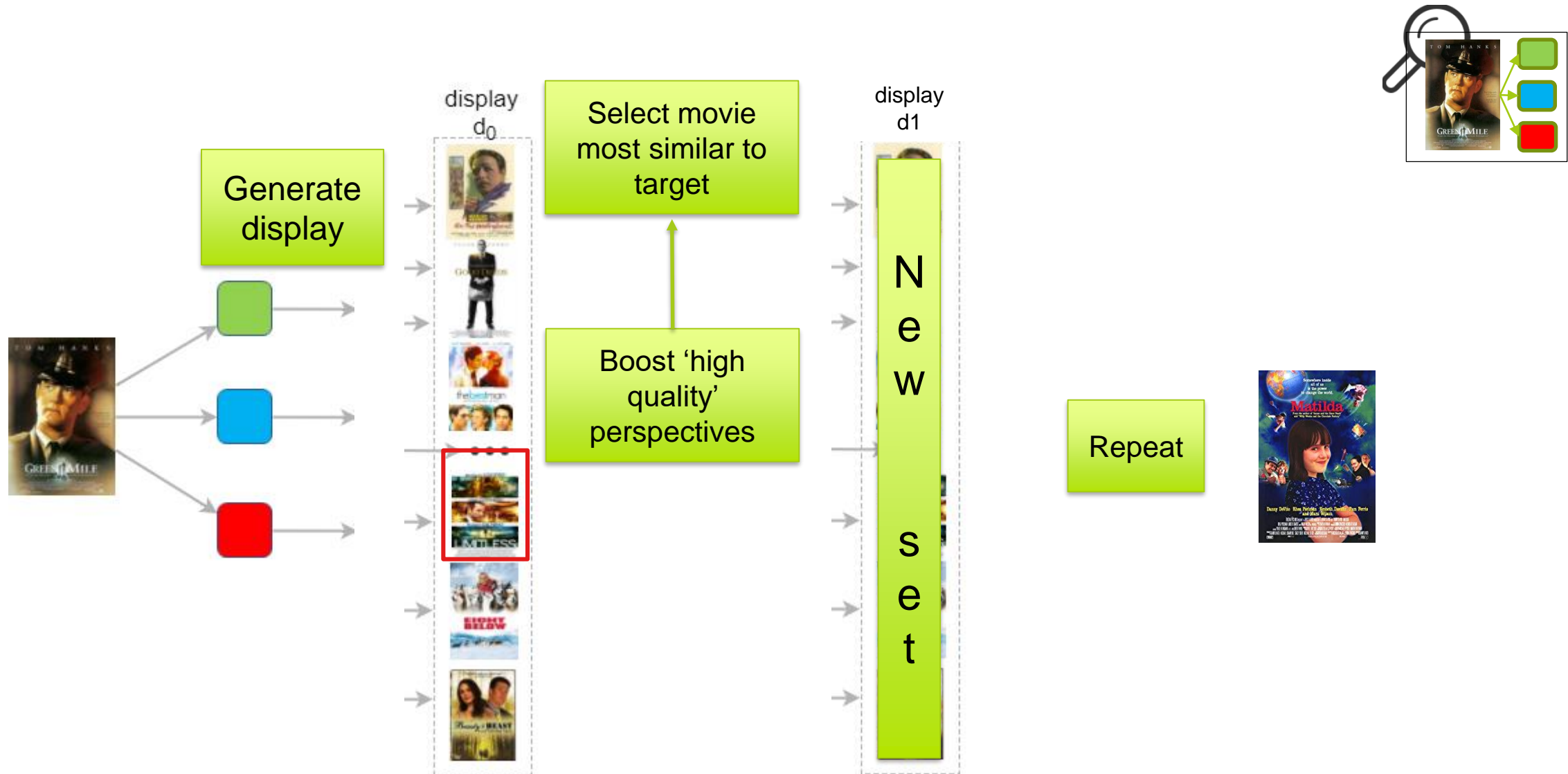
My kids loved this movie when they were younger. It was a great movie for kids and still is especially if they love the old video games.

This review seems related enough to the review of the selected movie for this perspective

Simulated User: Shared Perspectives



Simulated User: Shared Perspectives



Results – 100 Pairs

- Optimize “selection” step:

| Pairs | Single Representation | Three Shared Perspectives | Three SP + Usefulness |
|-------|-----------------------|---------------------------|-----------------------|
| 100 | 40.58 | 32.54 | 31.56 |

- Improvement for pairs with **unusually high** results
- More importantly: Implementation

In summary

- Some entity types require **perceptual features** to be effectively queryable
- Perceptual features can be **extracted** from user feedback
- User feedback is often conflicting
 - Current single-representations lose information!
 - Grouping perceptual features into **Shared Perspectives** covers this well
- Shared perspectives can be effectively used for **Query-by-Example similarity queries**



Perceptual Relational Attributes: Navigating and Discovering Shared Perspectives from User-Generated Reviews

Manuel Valle, Christoph Lofi, Mengmeng Ye

Table of students' features

| Aspect | Sum Importance | Avg Importance | mentions |
|---------------------|----------------|----------------|----------|
| storyline | 346 | 4.67 | 74 |
| acting | 341 | 4.73 | 72 |
| scenery | 197 | 4.10 | 48 |
| character | 186 | 4.53 | 41 |
| directing | 177 | 4.43 | 40 |
| sound | 162 | 2.74 | 59 |
| humor | 160 | 3.01 | 53 |
| originality | 67 | 2.48 | 27 |
| pace | 49 | 3.06 | 16 |
| cinematography | 46 | 2.70 | 17 |
| child friendliness | 3 | 3 | 1 |
| babes | 2 | 2 | 1 |
| morality | 2 | 2 | 1 |
| animal friendliness | 1 | 1 | 1 |
| Disney'ishness | 1 | 1 | 1 |

K-MEDOIDS

- Spherical k-medoids for Document Embeddings: Partitions the available tuples into k clusters.
 - Cosine distance: angle between tuples
 - The medoid is the central datapoint
 - Determine k by applying the “elbow method”: 3 clusters in average
 - Same number of clusters for all movies, for consistency

