A Hybrid Explanations Framework for Collaborative Filtering Recommender Systems

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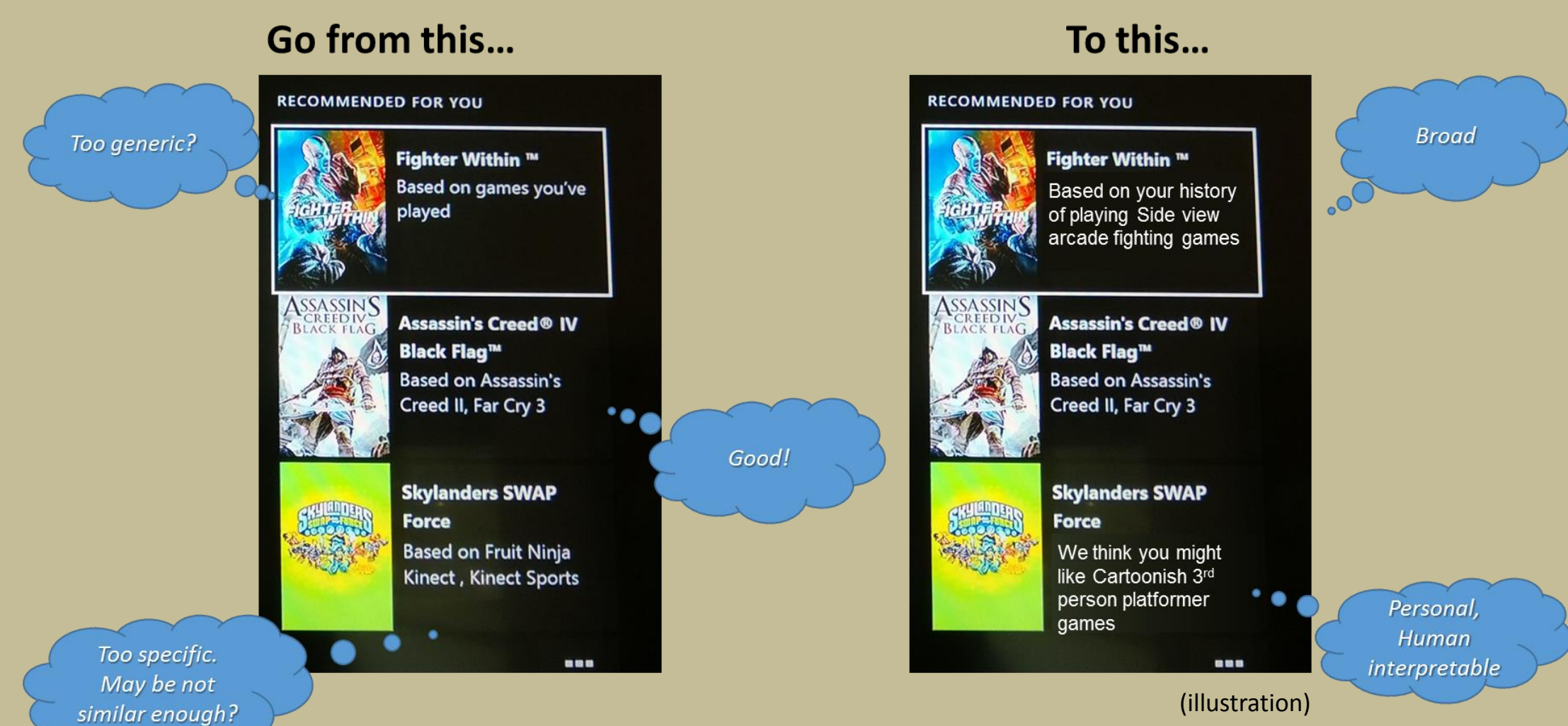
OSG RECOmmendations

XBOX

1. How would one enrich a CF based recommender to provide the user with good explanations?
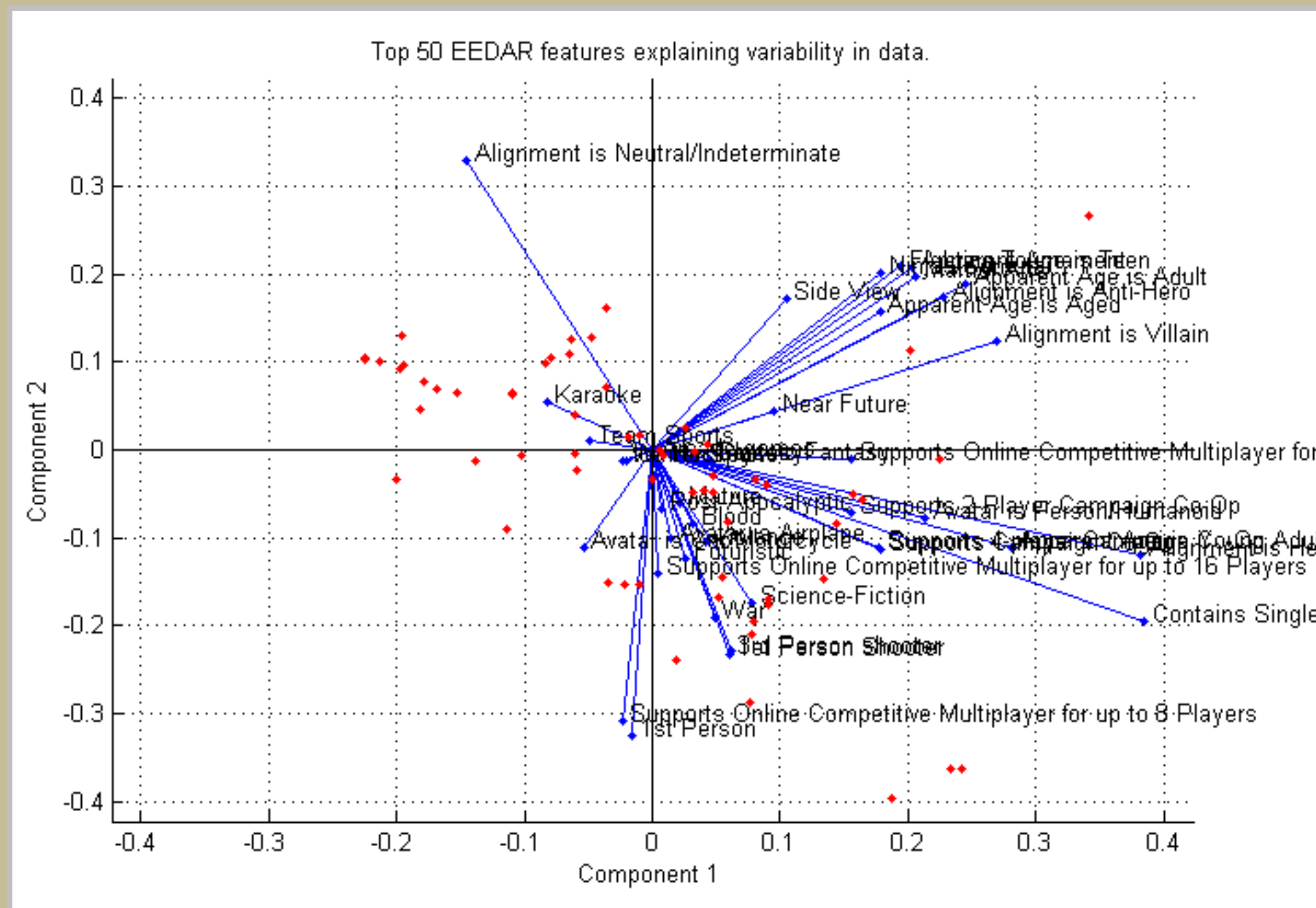
- Explanations accompanying a recommendation attempt to increase a user's confidence, help him make good purchase decisions faster, persuade him and attempt to increase the ease of usability or enjoyment in the system[1].

- CF systems tend to draw on item similarity in latent space which has several major drawbacks and tend to be vague or confusing.

- We utilize hand curated meta-data labels and implement a set of algorithms which given a user's history and recommended item find a satisfying explanation in a "lowest commend denominator" approach.

1) Based on "A Survey of Explanations in Recommender Systems", Masthoff et.al 2007

2. Motivating this work: Xbox One recommendations supply the user with a fixed style of explanation based on items from the user's history.
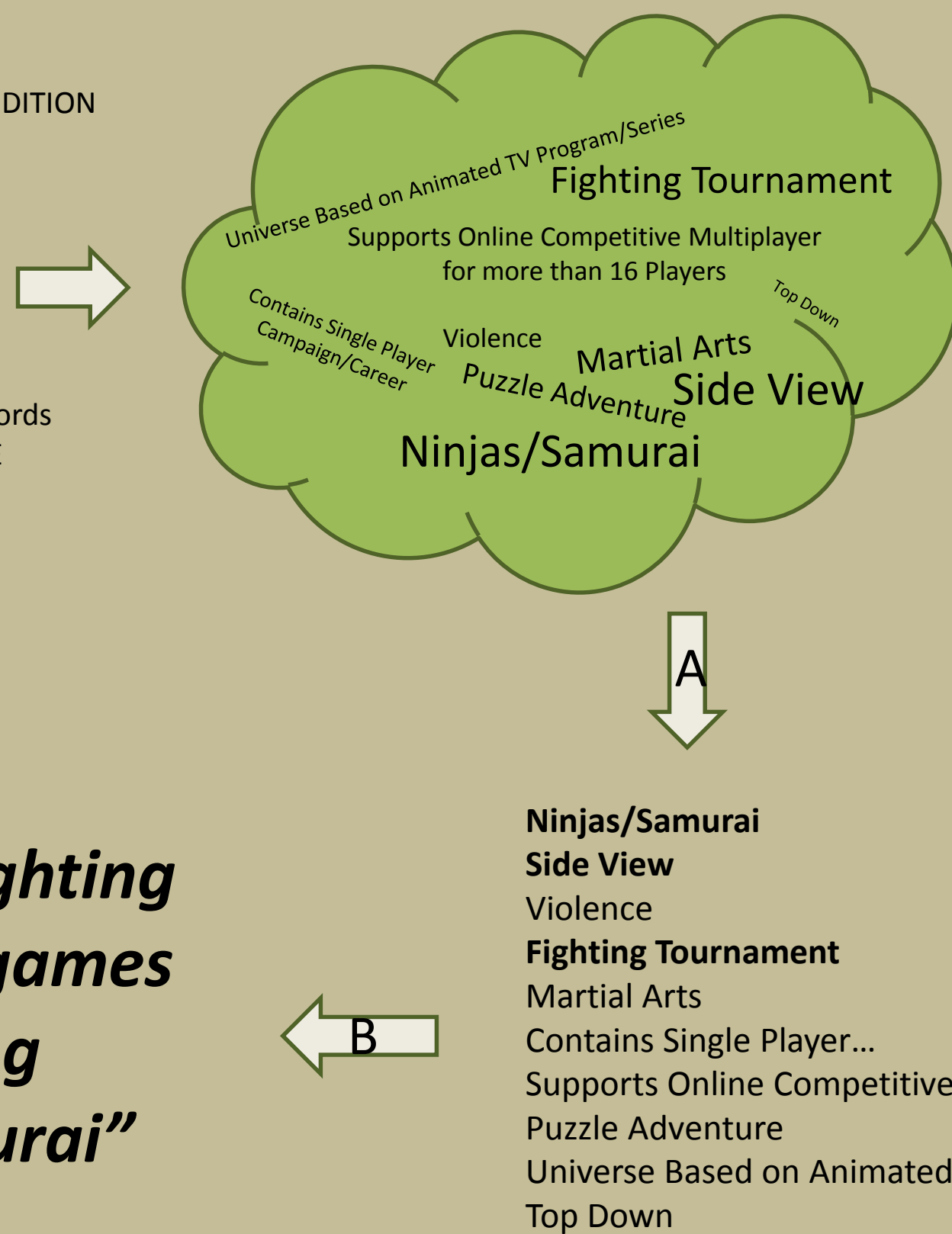

Go from this... To this...

Too generic? *Broad*

Too specific. May be not similar enough? *Good!* *Personal, Human interpretable*

(illustration)

3. Items are tagged with meta-data labels. Not all labels are equally informative or relevant for an explanation.

Top 50 EEDAR features explaining variability in data.
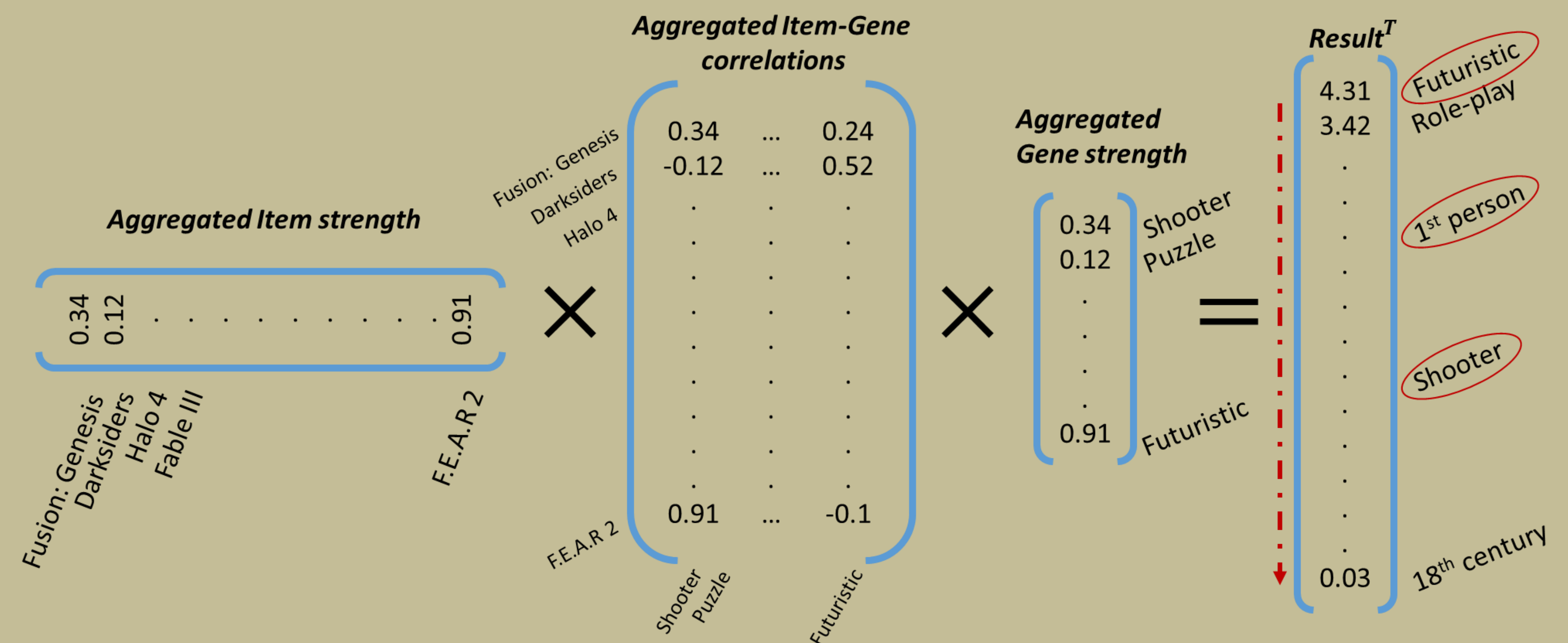
4. How do we take a set of items and distill their common labels?

- Compat Pack 3: Containment Suit
- Doomsday Skin
- SUPER STREETFIGHTER IV ARCADE EDITION
- ULTIMATE MARVEL VS. CAPCOM 3
- Dead or Alive 5
- Dead or Alive 5 Ultimate
- Soulcalibur IV
- SOULCALIBUR
- SAMURAI SHOWDOWN SEN
- Small Arms
- Puzzle Quest: Challenge of the Warlords
- THE KING OF FIGHTERS98 ULTIMATE MATCH
- Fighting Vipers
- SOULCALIBUR II HD ONLINE
- Trendy Customization Equipment
- Red Son Pack
- Cepheus Compatibility Pack 4
- Tekken Costumes 1

Fighting Tournament
Universe Based on Animated TV Program/Series
Supports Online Competitive Multiplayer for more than 16 Players
Contains Single Player Campaign/Career
Violence
Martial Arts
Puzzle Adventure
Side View
Ninjas/Samurai

A

Ninjas/Samurai
Side View
Violence
Fighting Tournament
Martial Arts
Contains Single Player...
Supports Online Competitive...
Puzzle Adventure
Universe Based on Animated...
Top Down

B

"Side View Fighting Tournament games containing Ninjas/Samurai"

5. We apply a modular approach to ranking related labels. Modules weigh items, labels or measure the correlation between an item and a label

Aggregated Item-Gene correlations

Aggregated Gene strength

Aggregated Item strength

$Result^T$

4.31 — Futuristic Role-play
3.42
1st person
Shooter
0.03 — 18th century

6. We then compute a natural-language-based rule-set which selects several highly-scored keywords and generates a sentence
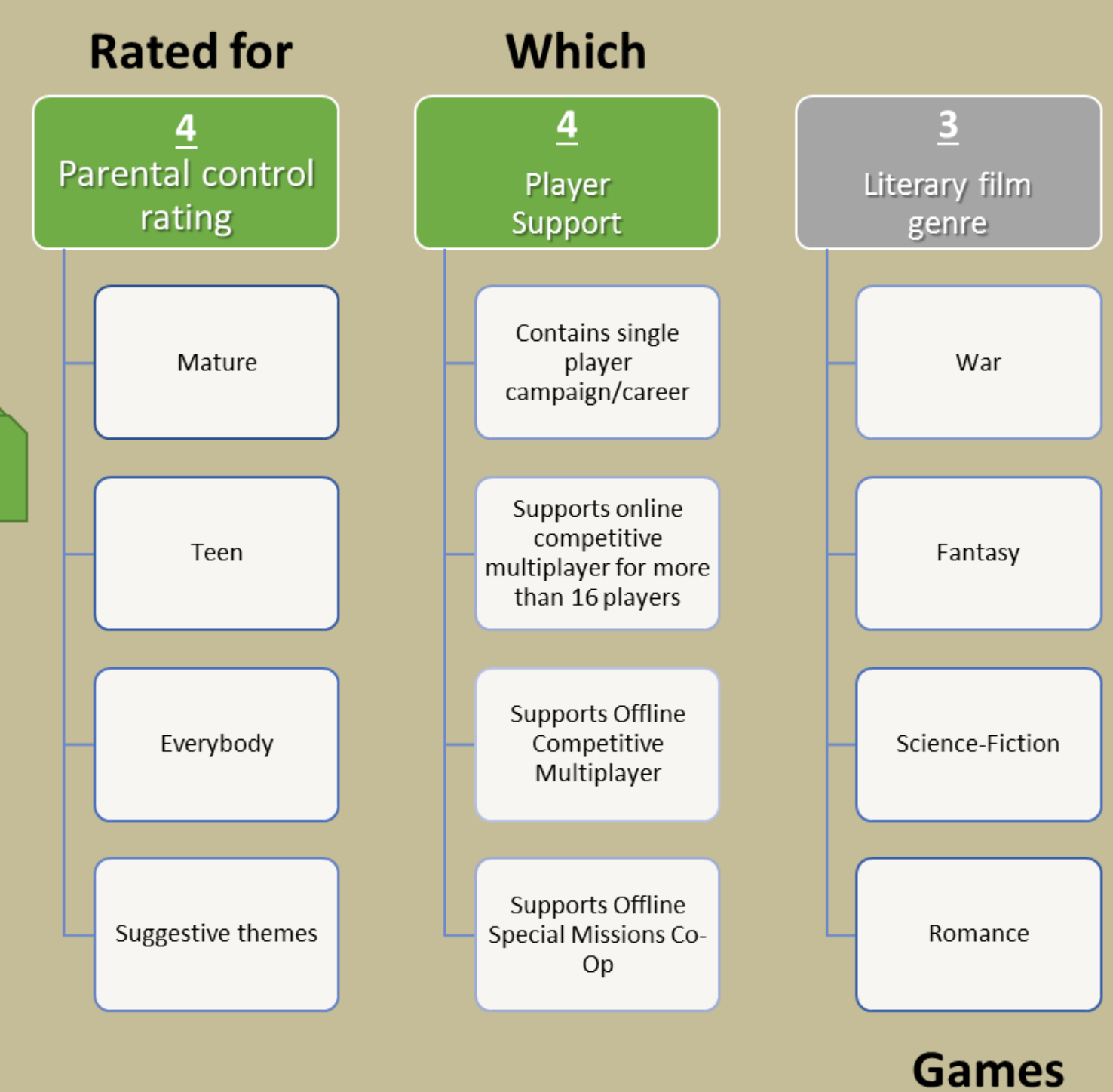
Sentence composition rules

- Each gene type gets a **sentence order id**, **preceding** and **following** connective words.

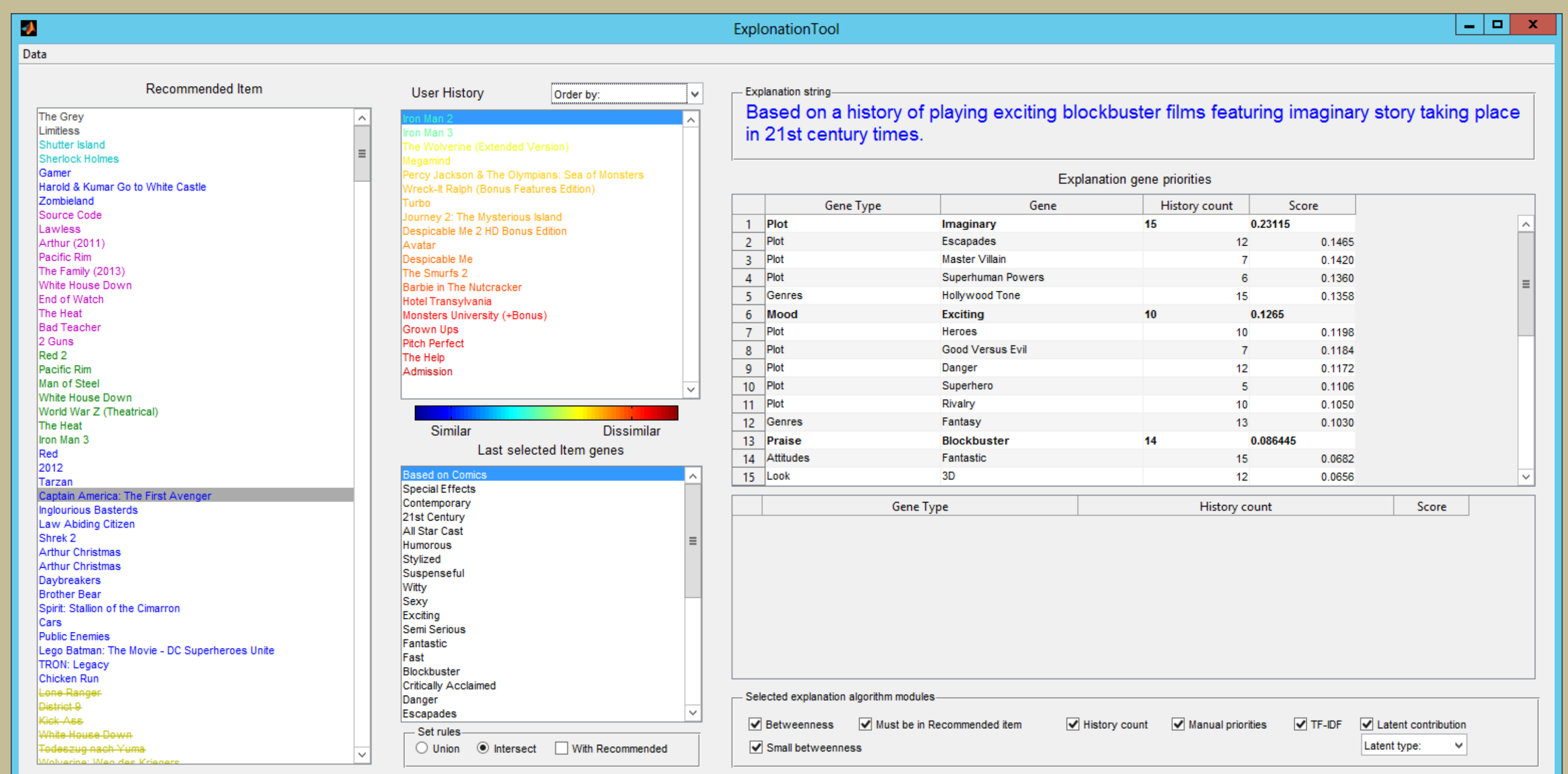- Genes are picked by scoring and sentence order id to compose the explanation in the following order:

Major Camera Prespective → General Graphical Style → Action Genre → Player Support

"Based on history of playing side view cartoonish beat-em-up games which contain single player campaign/career."

- If there is no legal gene, there is a fallback to gene types.

"We think you would like games with this Basic Avatar Characteristic."

Rated for	Which		
4 Parental control rating	**4** Player Support	**3** Literary film genre	
Mature	Contains single player campaign/career	War	
Teen	Supports online competitive multiplayer for more than 16 players	Fantasy	
Everybody	Supports Offline Competitive Multiplayer	Science-Fiction	
Suggestive themes	Supports Offline Special Missions Co-Op	Romance	

Games

7. Snapshot from the demo: ExploNation tool – exploring explanations on real data

8. Module examples:

- Module I – History Count (Personalization)
- Module II – Manual Priorities (Explanation quality)
- **Module III – TF-IDF (label quality)**
- Module IV –Must be in Recommended Item (Explanation quality)
- **Module V – Betweenness (Personalization)**
- **Module VI – Embedding Latent (Gene quality)**
  - PCA
  - Latent space embedding

Distance to recommendation

Aggregated Item-Gene correlations

TF-IDF counts

● Recommended item
● Item from user history
● Item in catalog