

— Recommender Systems



Movie Ratings





Cosine Similarity





Vector Magnitude





Vector Normalization (Unit Vector)





Dot Product





Dot Product Intuition





Why do we normalize?



Content-Based Recommenders

Based on **product features**

Title	Year	Genre	Director	MPAA Rating
Elf	2003	Christmas/Comedy	Jon Favreau	PG
Die Hard	1988	Christmas/Action	John McTiernan	R
How to Train Your Dragon	2010	Animation/Action	Dean DeBlois Chris Sanders	PG

Collaborative Recommenders: User-Based

Recommendations from **users** with similar **ratings**

	Movie 1	Movie 2	Movie 3
User 1	5	1	NOT WATCHED
User 2	4	1	4
User 3	1	5	1

Collaborative Recommenders: User-Based

Recommendations from **users** with similar **purchases**

	Movie 1	Movie 2	Movie 3
User 1	1	0	NOT WATCHED
User 2	1	0	1
User 3	0	1	0

Collaborative Recommenders: Item-Based

Recommendations from **products** with similar **ratings/purchases**

	User 1	User 2	User 3
Movie 1	4	5	2
Movie 2	2	1	5
Movie 3	5	4	2