Factorization Machine (FM)

Factorization Machine

Factorization Machine algorithm is optimized for handling high dimensional sparse datasets

Supports Regression and Classification

Personalize Content - “predict” ratings/likeness

- Click Prediction for Ad-Placement
- Product recommendation for user
- Movie recommendation
- News/Social Media Feed personalization for users

Factorization Machines

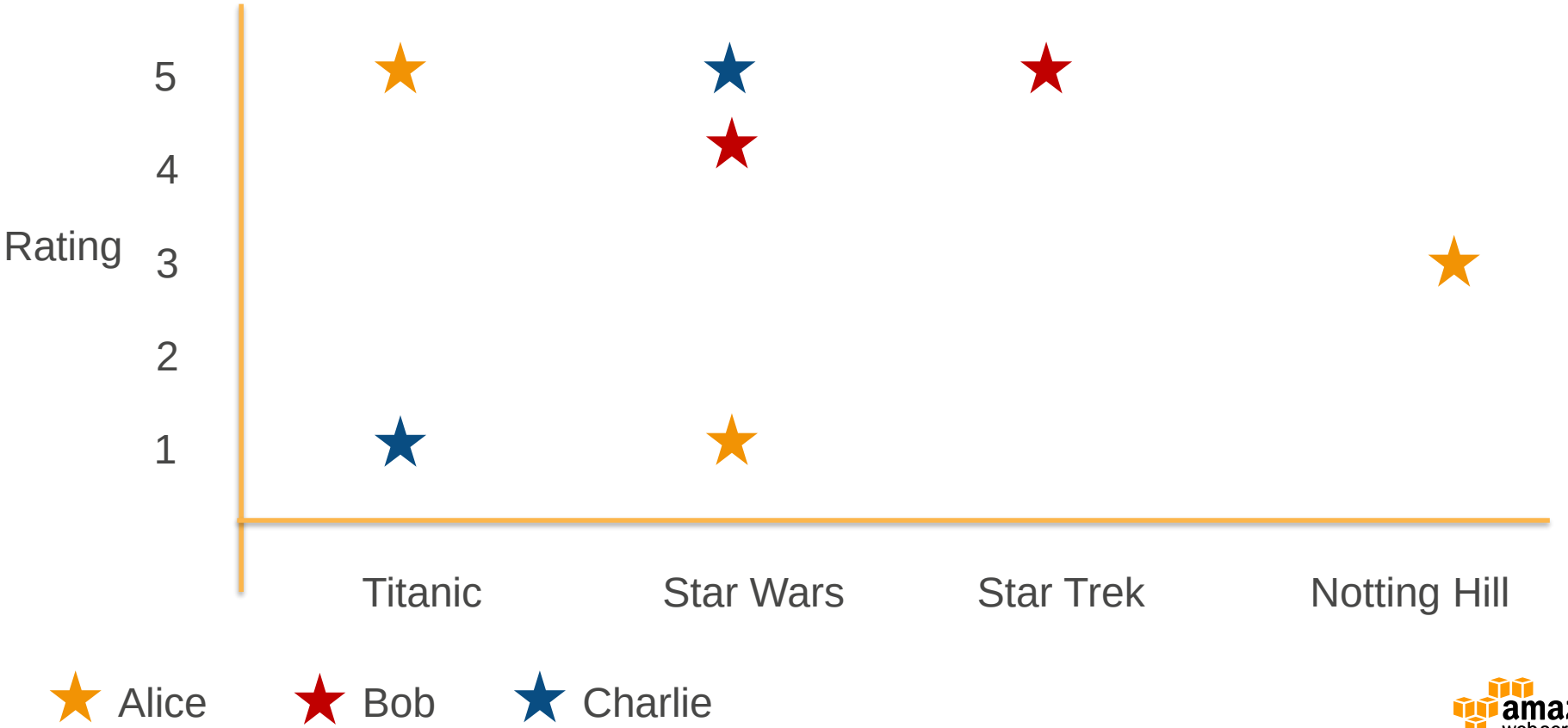
Models all interactions between features using Factorized Parameters

Estimate interactions with very sparse datasets

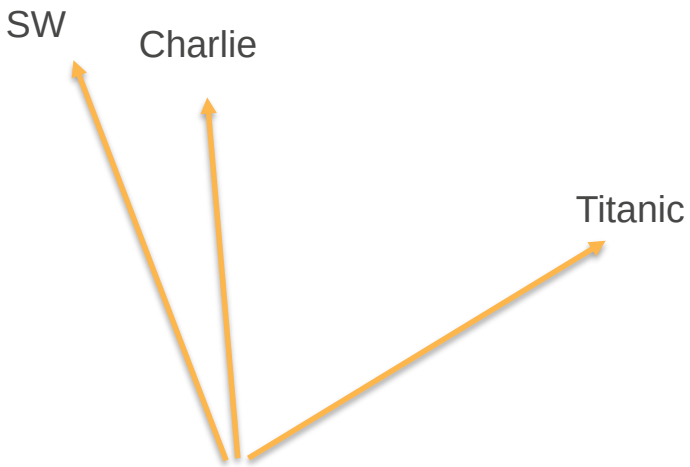
Linear complexity for computing model parameters

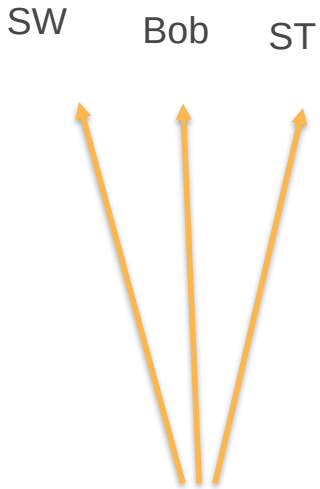
Supports very large datasets

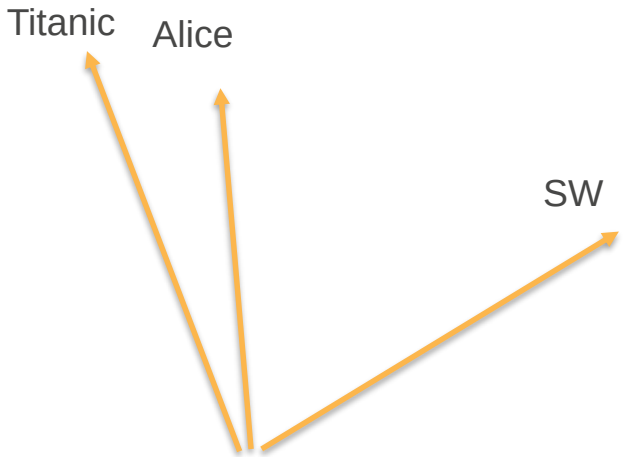
Movie and User



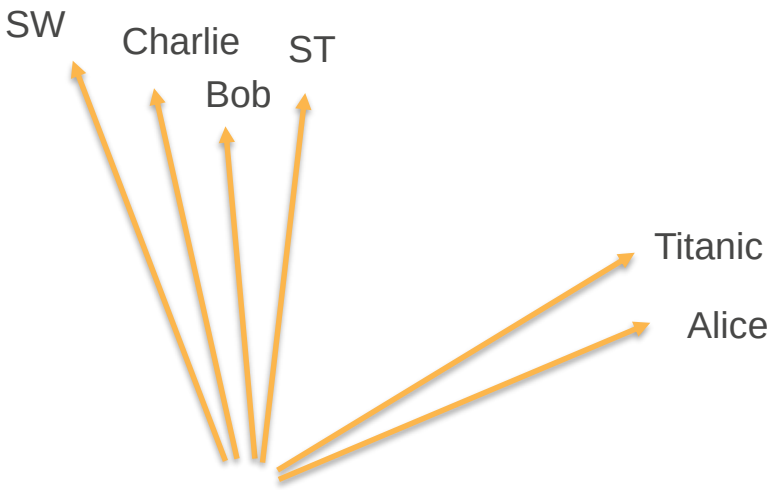
Pair Wise Interaction







Recommendation



Factorization Machine – Data Format

Input:

recordio-protobuf (with Float32 values)

Inference:

json

recordio-protobuf

Demo – Movie Recommendation

Movie Lens Dataset

Predict how a user would a movie

Recommend movies based on user rating, other similar users and other similar movies

fm\movie_data_preparation.ipynb,
fm_cloud_training_template.ipynb,
fm_cloud_prediction_template.ipynb

Demo Movie Recommendation Files

File Name	Purpose
Movies.csv	List of movies [movie id, title, genre]
Ratings.csv	Movies ratings by user [user id, movie id, rating]
Movie_genre.csv	Movies with Genre in separate columns
user_movie_{train|test}.recordio	Sparse RecordIO Train/Test Data – OneHotEncoded [user id, movie id], Rating
user_movie_{train|test}.svm	Sparse SVM Train/Test Data – Easy to read with text editor.
one_hot_enc_movies.svm	List of movie ids and corresponding one hot encoded movie column identifier
one_hot_enc_users.svm	List of user ids and corresponding one hot encoded user column identifier

Useful Resources

Factorization Machines by Steffen Rendle

LibFM Software

Comparison of LibFM Implementations by Alex Rogozhnikov

Collaborative Filtering by Anand Rajaraman