Movie Recommendation System

CS9223D Cloud Computing
Professor Sambit Sahu
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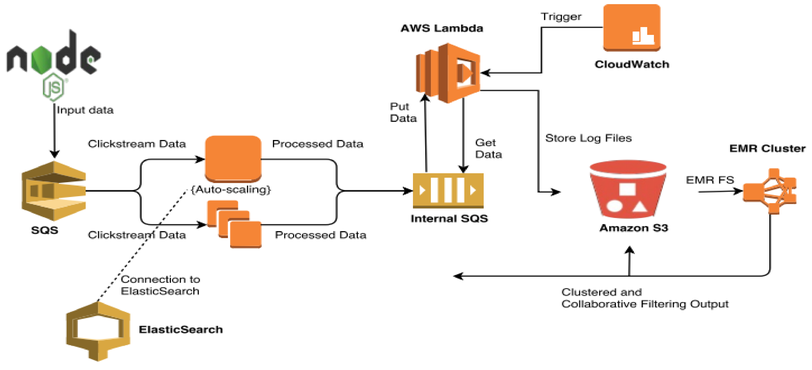
Goal

A scene based movie recommendation system based on movies from TMDB that uses clickstream data processing for effective collaborative filtering and deep learning.

Workflow

- The project is split into 4 main categories.
- App Server
- Audience tagging/Clustering service
- Content Tagging service
- Recommender service

Audience tagging and clickstream data processing



Clickstream data

- Designed for a fast read-lazy write system.
- Processes all clickstream data including debouncing & dedouping.
- Stores the processed data in another internal SQS for speed.

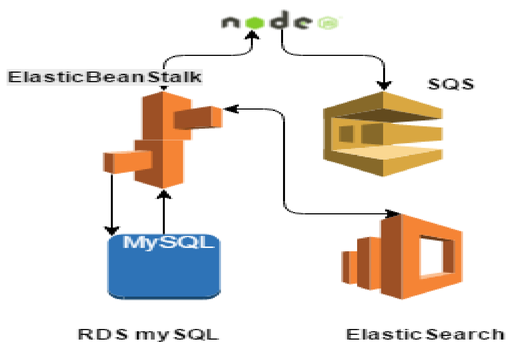
Logging data

- An independent lambda service deques the internal sqs to write logs to S3 bucket.
- This log serves as input to Clustering users for collaborative filtering recommender service.

Clustering in spark

- A spark job that runs in EMR cluster environment filters all logs for movie clicks.
- Uses Kmeans clustering for 27 genres and 27 clusters.
- The resultant rdd is passed for collaborative filtering.

App Server architecture



App Server - tasks

UI works

- Users can login/signup to this web application and stream movies.
- Automatic movie recommendations are provided to users.
- Users can also browse movies based on genres/keywords.

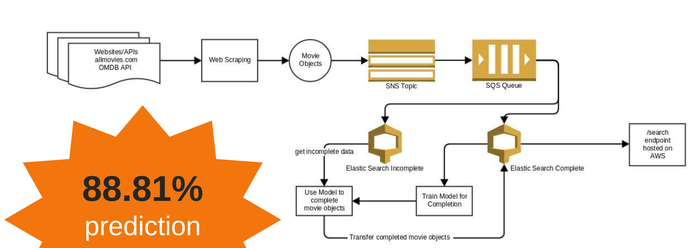
User meta data

- The main meta data is the users clickstream data catagorised into events. Each of these events are published to a SQS queue as json.

Dependent on services

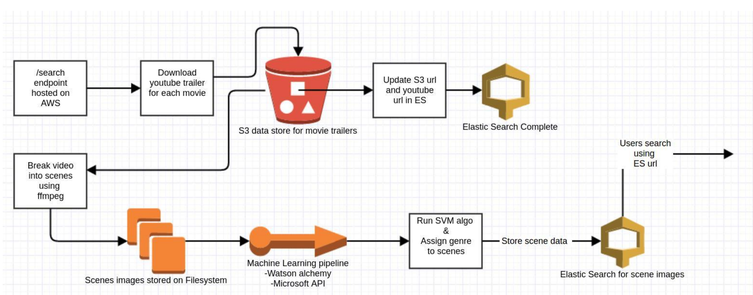
- The recommendation of movies depends on the call issued to recommender service that spontaneously gives a set of movies.
- Uses the tags generated by content tagging service to browse movies.

Content tagging phase I

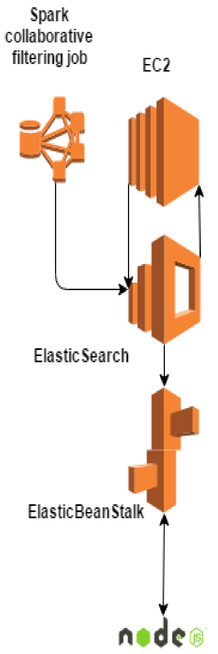


88.81% prediction accuracy

Content tagging phase II



Recommender service



- Uses the clustered data to perform collaborative filtering ALS algorithm on each cluster and update the dependencies in ElasticSearch. Using clustered data reduces computational time without much loss of accuracy.
- Also uses the graph algorithm to find similar movies . Uses the genres and other keywords provided for each movie to create a graph, connecting all movies. The degree of connection/ the number of links between each movie tells the similarity between movies.
- Communicates with frontnd to provide spontaneous responses for recommendation requests received.

- **Algorithms used** -
- Collaborative Filtering
- Connected components in a graph

Different use cases for recommendation

- When new user / old user signs in
- When new user / old user clicks a movie
- When new user / old user clicks a genre

Conclusion

- In this project, a prototype system for a scene based movie streaming and recommendation system was built on a sample set of data. The project covers a wide area of web development, machine learning and real time big data processing which helped us to learn new real world nuances and contribute a working model. We thank professor Sambit Sahu for giving us this opportunity to learn and work parallel in a real worl system.