HAIL, HYBRID!
A BETTER RECOMMENDATIONS ENGINE

May 2019
WHAT WE’LL COVER TODAY

• Who is SoftServe
• Why We Started This Journey
• The Modern Hybrid Recommendations Engine
• Data Science Behind It
• What We Learned
ABOUT SOFTSERVE

8,000+
EMPLOYEES
We hire 10-12 daily

4,500+
LARGE SCALE CUSTOMER PROJECTS

30+
OFFICES
Europe & USA

6,000+
SOFTWARE ENGINEERS

12
COUNTRIES
With SoftServe Clients

700+
CLOUD EXPERTS
300+ Cloud DevOps Focused

25
YEARS BUILDING ENTERPRISE SOFTWARE
Founded in 1993

70
NET PROMOTER SCORE (NPS)
More than twice as high as our competition
<table>
<thead>
<tr>
<th>KEY TECHNOLOGIES AND PRACTICE AREAS</th>
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<tbody>
<tr>
<td>experience design</td>
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<tr>
<td>cybersecurity</td>
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<tr>
<td>mixed reality</td>
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PROBLEMS WE SOLVE IN MEDIA

Video Content Supply Chain
Capture and Ingest
Analyze and Manage
Transcode and Distribute

Cloud Based Workflows
Rendering Farms
Transcoding
MAM / DAM Solutions

Data Analytics
Data Workflow / Data Pipeline Design
Business Solutions (recommendations, churn prediction, attribution)
Machine Learning & AI

DevOps and Automation
Serverless Architecture
Cloud Native and Containerization
WHY WE EMBARKED ON THIS JOURNEY
DATA TYPES

Content Data
Player Data
Geographic Data
Conversion Data
I AM AN INDIVIDUAL
NOT A DEMOGRAPHIC
INTEGRATED DATA TYPES

Trends
Social graphs
Linear past consumption habits
Interests in celebrities, topics, genre, etc...
Gender
Demographics
Time user is active
Device type(s)
Other interests
Innovative retail personalization approach that leverages OCEAN psychometric concept to help retailers identify customer personality profiles and suggest the best way to communicate and engage with the consumers.

CONSUMERS PSYCHOMETRIC PROFILING

Shopping Habits + Verbatim Data from Social Media

LEARN MORE

softserve
It combines data analytics with Ocean/BIG5 approach and technology to reach a deep understanding of the customer.
WHAT PROBLEMS ARE WE SOLVING

Customers have more choices than ever to watch content.

Keep them on your platform, and keep them engaged and coming back.

Create a competitive advantage.
CREATING A COMPETITIVE ADVANTAGE

Revenue Driven

Customer Experience Driven
CREATING A COMPETITIVE ADVANTAGE

Revenue Driven

1. Increase viewer engagement
   - Longer time spent viewing content on platforms
   - Increase advertising impressions

2. Change viewer behavior
   - Change from passive viewer to engaged viewer
   - Engage in a fair exchange of data for a better experience
   - Be willing to accept recommendation. Build trust on content
CREATING A COMPETITIVE ADVANTAGE

Revenue Driven Cont....

3. Reactivate dormant viewers
   • Have the ability to make tailored recommendations to viewers who signed up to watch a specific piece of content
   • Drive platform adoption and position provider as a source of entertainment across multiple genres

Customer Experience Driven

1. The ability to identity viewers by persona along with associated content tastes, preferences, and viewing habits
2. The ability for business users to glean key insights from data through intuitive visuals and other mechanisms that enable them to make business decisions
HAIL HYBRID.
BOHEMIAN RHAPSODY

135m | Drama Music

Singer Freddie Mercury, guitarist Brian May, drummer Roger Taylor and bass guitarist John Deacon take the music world by storm when...
How Does It All Work?

Recommendation Engine Components

Mixture of Recommenders (Unlimited)

• Content-Based
• Collaborative-Based
• Hybrid

User Profile

• User Feedback
• User Interaction

Global Probabilistic Electors (Thompson Sampling)
THE MATH BEHIND IT ALL

Thompson Sampling

• In artificial intelligence, Thompson sampling is a heuristic for choosing actions that addresses the exploration-exploitation dilemma in the multi one-armed bandit problem.

• It consists in choosing the action that maximizes the expected reward with respect to a randomly drawn belief.

• It has been proved that Thompson sampling is instantaneously self-correcting.
DATA SCIENCE ALGORITHMS IN ACTION
WHY HAIL HYBRID?

Hybrid Approach

• The engine can evaluate an unlimited number of data sources used in the recommenders – machine learning algorithms that compare data sets, user actions, social activity, retail data, etc.

• All of these various recommenders are processed and sent to the Recommendation Learning Agent to use probability sampling algorithms in order to find the most likely matches.

• As this process is repeated over time, the data and machine "knowledge" becomes even more accurate and rewarding.
MAKING IT PERSONAL

User Insights

• User feedback such as ratings and likes

• Direct user activity with the application/recommendation engine

• Consumption habits – duration and time of day

• Social data

• Retail data

• Geographic/demographic data
MAKING IT OPEN & SCALABLE

Additional Highlights

• Taking a containerized approach allowed extreme burst capacity enabling us to chunk through huge amounts of data in micro-seconds and even nano-seconds

• The architecture is built on an open source codebase and open and with open source technologies. The recommendations engine framework does not need to be purchased or licensed. It is also cloud agnostic

• The inputs are unlimited and customizable. You can perfect the engine to your customer base or target viewership based on data inputs and algorithm calculations
KEY TAKEAWAYS

• An incredible amount of data is available: Put it to use

• Transparency and Trust: People want to know why recommendations were made and what data was used

• You’ll need a test group: Be nice to your friends and co-workers
FOR THE FUTURE