DISCOVERY CHALLENGE

Chat Analytics for Twitch

Konstantin Kobs
Martin Potthast
Matti Wiegmann
Albin Zehe
Benno Stein
Andreas

Hothe
Introductory Round

Just say your name, affiliation, and why you attend this session!
Twitch.tv
Twitch: Game Streaming Platform

- launched 2011
- bought by Amazon 2014
Twitch: Key Performance Indicators

2 million concurrent viewers  
90,000 concurrent streams  
> 30 languages

> 1.5 billion hours watched per month (since corona)  
1 million unique daily streamers  
7 million active streamers

1 billion public Twitch chat comments per month

https://twitchtracker.com/
Twitch: Business Model

4.99$/month

Benefits
ad-free viewing of the channel
subscriber-exclusive chat rooms
subscriber-only emotes
subscriber badge

9.99$/month

Benefits
everything from 4.99$/month
more emotes

24.99$/month

Benefits
everything from 9.99$/month
even more emotes

Top 20 channels generate nearly 800 000$/month through subscriptions alone¹

Revenue through advertisements before and during streams, sponsorings, ...

50% for the streamer, 50% for Twitch

¹ estimated with numbers from https://twitchtracker.com/subscribers
### Twitch: Research Subject

#### Research Questions

- When and why are users watching?
- What games do users like to watch?
- How do chat users interact with each other?
- Do users like what they see?
- Do subscribers behave differently than non-subscribers in chat?
- ...

#### Research Fields

- Natural Language Processing
- Image Processing
- Audio Processing
- Recommender Systems
- Graph Analysis
- Social Studies
- ...

ChAT Discovery Challenge

**Question**
Do subscribers behave differently than non-subscribers in chat?

**Task**
“Build a *binary classifier* that predicts the *subscription status* of users in Twitch channels *given their chat messages*”
Application

not subscribed user-channel combinations
user 1 / channel A
user 2 / channel B
user 3 / channel C
...

subscription classifier

not subscribed

subscribed

Follow-up Question: Do unsubscribed users who are misclassified as subscribed to a channel make good marketing targets?
Emotes
Slang
Short messages
“Shouting” & mistakes
Twitch, another Language

- Emotes are crucial to Twitch’s language
- Fairly different from common English
- Emotes provide a way to express opinions and emotions

<table>
<thead>
<tr>
<th>Rank</th>
<th>Twitch</th>
<th>Twitch (no emotes)</th>
<th>English</th>
<th>Twitter</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>🎥 LUL</td>
<td>like</td>
<td>new</td>
<td>tinyurl.com</td>
</tr>
<tr>
<td>2</td>
<td>🌟 Kappa</td>
<td>get</td>
<td>home</td>
<td>new</td>
</tr>
<tr>
<td>3</td>
<td>💚 &lt;3</td>
<td>lol</td>
<td>us</td>
<td>like</td>
</tr>
<tr>
<td>4</td>
<td>👾 PogChamp</td>
<td>u</td>
<td>page</td>
<td>get</td>
</tr>
<tr>
<td>5</td>
<td>like</td>
<td>good</td>
<td>search</td>
<td>get</td>
</tr>
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<td>6</td>
<td>get</td>
<td>2</td>
<td>free</td>
<td>time</td>
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<td>7</td>
<td>lol</td>
<td>1</td>
<td>one</td>
<td>day</td>
</tr>
<tr>
<td>8</td>
<td>😃 :D</td>
<td>game</td>
<td>information</td>
<td>one</td>
</tr>
<tr>
<td>9</td>
<td>😗 Kreygasm</td>
<td>stream</td>
<td>time</td>
<td>twitter</td>
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<tr>
<td>10</td>
<td>🙌 Clap</td>
<td>got</td>
<td>site</td>
<td>going</td>
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<td>11</td>
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<td>one</td>
<td>may</td>
<td>go</td>
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<td>12</td>
<td>good</td>
<td>go</td>
<td>news</td>
<td>rt</td>
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<td>13</td>
<td>😈 :)</td>
<td>play</td>
<td>use</td>
<td>know</td>
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<tr>
<td>14</td>
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<td>xD</td>
<td>see</td>
<td>today</td>
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<tr>
<td>15</td>
<td>game</td>
<td>know</td>
<td>contact</td>
<td>love</td>
</tr>
<tr>
<td>16</td>
<td>game</td>
<td>know</td>
<td>business</td>
<td>work</td>
</tr>
<tr>
<td>17</td>
<td>🎥 HeyGuys</td>
<td>time</td>
<td>web</td>
<td>got</td>
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<tr>
<td>18</td>
<td>🎥 BibleThump</td>
<td>think</td>
<td>also</td>
<td>2</td>
</tr>
<tr>
<td>19</td>
<td>stream</td>
<td>see</td>
<td>help</td>
<td>back</td>
</tr>
<tr>
<td>20</td>
<td>got</td>
<td>back</td>
<td>get</td>
<td>think</td>
</tr>
</tbody>
</table>

Emote Intensification

- Word2Vec trained on Twitch chat messages
- Intensification of emotes possible

→ Emotes capture meaning

Emote Lexicon

Build a sentiment classifier for Twitch chat messages

→ Able to get real-time sentiment of a stream’s audience

Twitch: Research Subject

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ChAT Data

Raw Data
> 700 000 000 public Twitch comments from January 2020
metadata (timestamp, game)

Preprocessing
English channels
user-channel combinations without changing subscription status

Training Dataset
> 400 000 000 comments
> 29.5 million user-channel combinations

Test Dataset
90 000 user-channel combinations

→ download both datasets on the challenge’s website
Testset Sampling

- Categorize users and channels into low (25%) / normal (50%) / high (25%) activity groups
- 10 000 user-channel combinations for each activity group combination → 90 000
  - low user — low channel
  - low user — normal channel
  - ...
  - high user — high channel
- For 50% of test users, remove all comments from other channels in the training dataset

→ Analyze how models handle different user and channel activities and new users
Training Dataset

- ~150,000 channels
- ~8 million users
- **29.5 million user-channel combinations** that **had at least one comment**
- 8.02% **subscribed**, 91.98% **not subscribed**
- On average, users comment in **3.73 channels** and are subscribed to **1.5 channels**
- Comments per user in channel:
  - **subscribed**: 55.66
  - **not subscribed**: 43.08
- Number of comments per channel: 2802.61
Evaluation

<table>
<thead>
<tr>
<th>Performance Measure</th>
<th>Baseline</th>
</tr>
</thead>
<tbody>
<tr>
<td>Precision</td>
<td>Sampling randomly from the training distribution:</td>
</tr>
<tr>
<td>Recall</td>
<td>8.02% subscribed $\leftrightarrow$ 91.98% not subscribed</td>
</tr>
<tr>
<td>$F_1$ score</td>
<td></td>
</tr>
</tbody>
</table>

software submission process over TIRA.io
Statistics

- 3 months to complete the task
- 23 team registrations
- 4 model submissions over TIRA.io
- 3 descriptive papers
## Results

<table>
<thead>
<tr>
<th>Rank</th>
<th>Team</th>
<th>Precision</th>
<th>Recall</th>
<th>F&lt;sub&gt;1&lt;/sub&gt;</th>
<th>Runtime</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>VoyTECH</td>
<td>0.2796</td>
<td>0.4446</td>
<td>0.3433</td>
<td>00:07:39</td>
</tr>
<tr>
<td>2</td>
<td>CoolStoryBob</td>
<td>0.1904</td>
<td>0.4341</td>
<td>0.2647</td>
<td>00:05:34</td>
</tr>
<tr>
<td>3</td>
<td>ItsBoshyTime</td>
<td>0.4808</td>
<td>0.1775</td>
<td>0.2593</td>
<td>00:00:19</td>
</tr>
<tr>
<td>4</td>
<td>StinkyCheese</td>
<td>0.0817</td>
<td>0.5487</td>
<td>0.1422</td>
<td>00:13:06</td>
</tr>
<tr>
<td></td>
<td>Random Baseline</td>
<td>0.0689</td>
<td>0.0802</td>
<td>0.0741</td>
<td></td>
</tr>
</tbody>
</table>
Team ItsBoshyTime

- Exploit some shortcomings of the dataset:
  
  If users are subscribed to a channel, they can use subscriber-exclusive emotes

- Idea
  
  ○ Extract subscriber-only emotes from training dataset using a heuristic
  ○ For a new user-channel combination: Does the user uses subscriber-only emotes from this channel?
    ■ If yes: predict subscribed
    ■ If no: predict not subscribed

→ Disqualified
Results

CoolStoryBob: 2
- Marvin Gärtner
- Andreas Theissler
- Marc Fernandes

voyTECH: 1
- Immanuel Bayer
- Anastasios Zouzias

StinkyCheese: 3
- Túlio Corrêa Loures
- Gustavo Lúcius Fernandes
- Fernanda G. Araújo
- Karen S. Martins
- Pedro O. S. Vaz de Melo
Agenda for this Session

15:00 – 15:15: Welcome and overview talk by the organizers
“Towards Predicting the Subscription Status of Twitch.tv Users”
Konstantin Kobs, Martin Potthast, Matti Wiegmann, Albin Zehe, Benno Stein, Andreas Hotho

15:15 – 15:45: Talk by team voyTECH and Q&A
“User Activity Modeling with Boosting Trees”
Immanuel Bayer, Anastasios Zouzias

15:45 – 16:15: Talk by team CoolStoryBob and Q&A
“Detecting Potential Subscribers on Twitch: A Text Mining Approach with XGBoost”
Marvin Gärtner, Andreas Theissler, Marc Fernandes

16:15 – 16:45: Talk by team StinkyCheese and Q&A
“Chat-Based Model for Subscription Classification”
Túlio Corrêa Loures, Gustavo Lúcius Fernandes, Fernanda G. Araújo, Karen S. Martins, Pedro O. S. Vaz-de-Melo
Team voyTECH

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