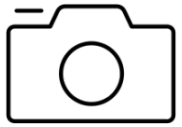
Feel free to take photographs



Know Your Audience*

Exploring Livestream Chat Through Machine Learning

IGGI Conf ‘19

Charlie Ringer | @charlieringer

Goals

Primary Goal: Develop methods for sensibly incorporating livestream chat data in audio-visual models.

Secondary Goal: Find techniques that use these text models to uncover information about livestream chat .

Caveat

This research is unpublished and work-in-progress.

Therefore, the methods and results in this talk are not final.

Overview

1. Introduction to Livestream Chat
2. Word Vectors
3. Cluster Analysis
4. Conclusions

1. Introduction to Livestream Chat

Livestreaming and Twitch.tv

Livestreaming is the act of **live broadcasting** yourself while performing an **activity** (in our case gaming).

Twitch.tv is the most popular livestreaming platform.

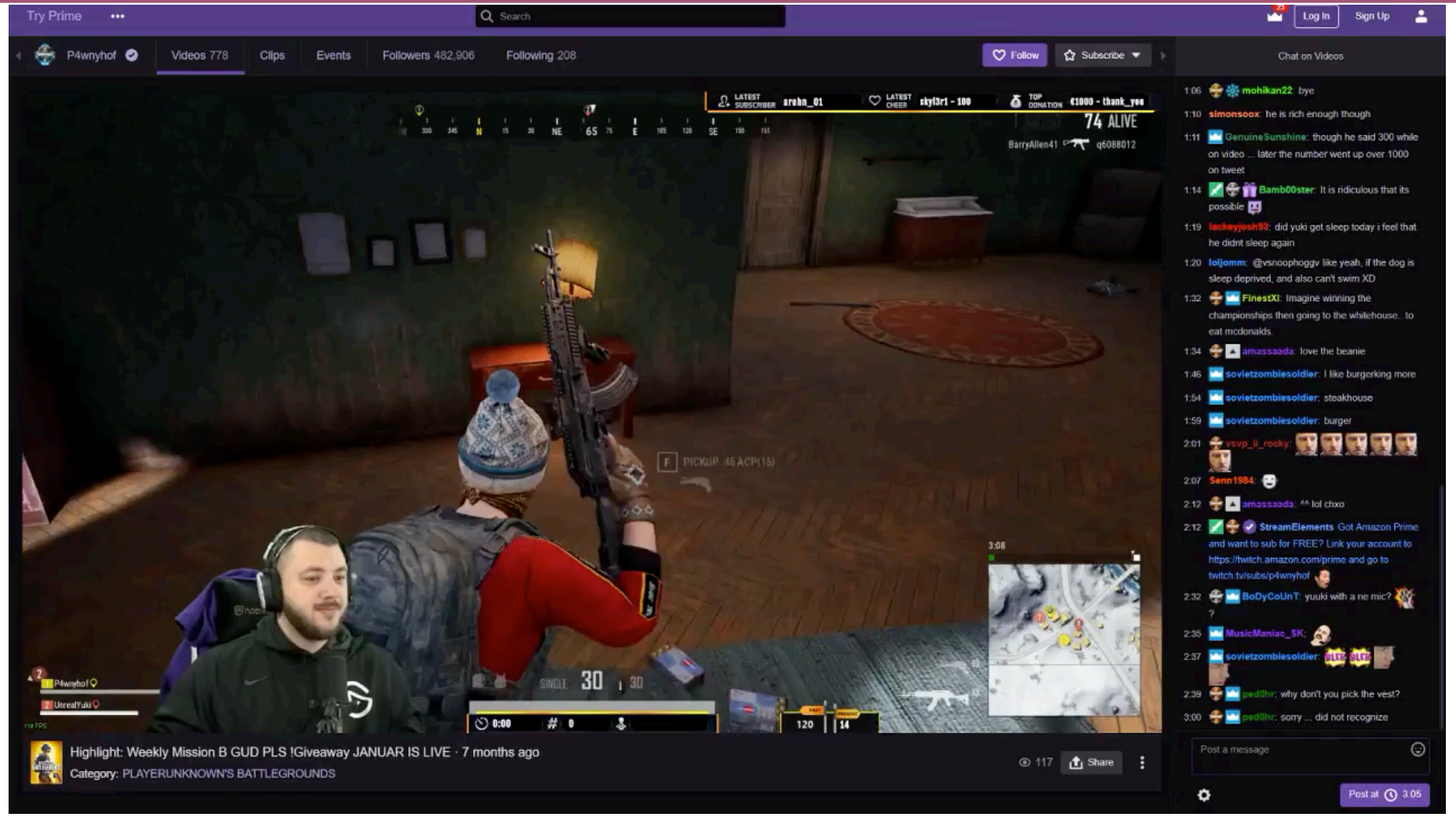
Three main stream categories:

- eSports/Mind Sports
- Individuals streaming game play sessions
- ~~IRL channels~~

Twitch.tv is extremely **popular**:

- **More average viewers** than all but the largest US cable TV channels
- Average **1.34m viewers** and **48.3K channels**
- **~58 billion** minutes watched per month
- Over **132 years** of footage per day

What is in a Stream?



Challenges

We don’t know what any of it means. Twitch chat is build upon stream specific words or different usage of known words.

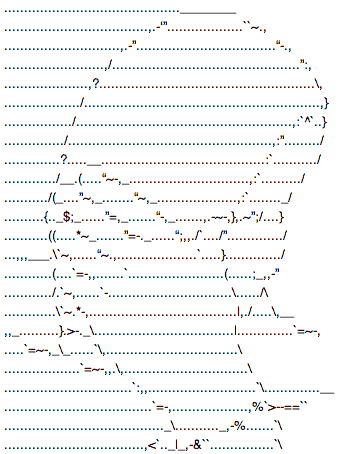
Data is extremely noisy, misspellings are common but cleaning is tricky, when is a misspelling not a misspelling?

Most Natural Language Processing focuses on prose, **chat is not prosaic** but formed of short ‘staccato’ messages.

4 stages of **Emoj**:

- Emoticons
- Emoji
- Emotes
- (E)Asci Art

:)



Data Set

Data was gathered from **Twitch.tv** by joining **popular streamer's** chat via IRC and listening to each message.

20 games, **401** channels, **971** streams

	Total Words	Unique Words
Raw Data	24 million+	1.13 million+
Cleaned Data	17.37 million	10,065

~70% of the **data** can be expressed with just **~8%** of **unique** tokens.

2. Word Vectors

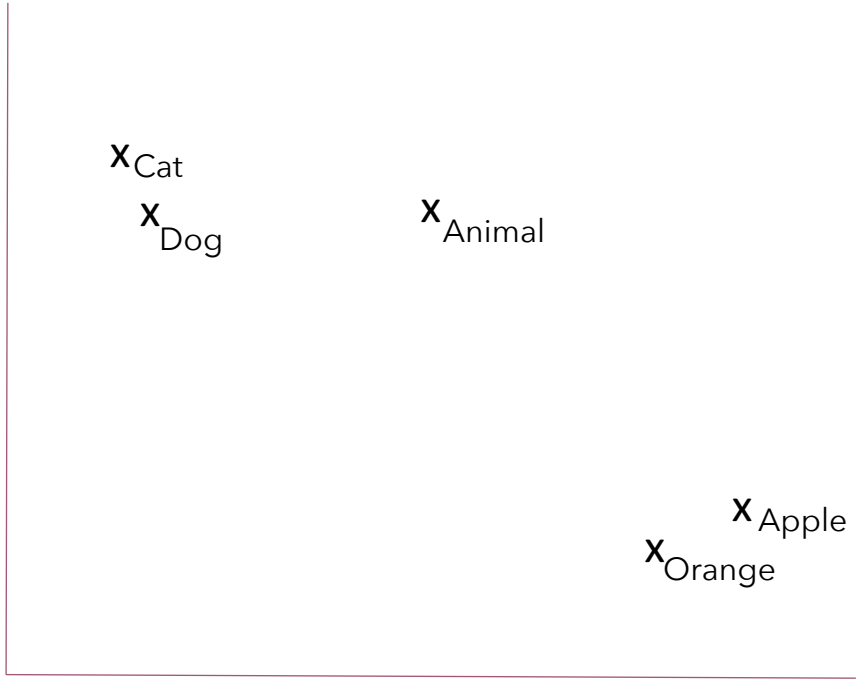
Word Vectors, the cliff notes version

Problem: Neural Networks require inputs values not words.

'Word Vectoristion' takes words and **projects** them in a high-dimensional latent **space.**

This can be thought of as giving **each word** a set of **coordinates**.

Hopefully **similar words** have similar **coordinates.**



Cat	(1.0, 6.0)
Dog	(1.5, 5.0)
Animal	(3.2, 5.0)
Apple	(6.0, 2.3)
Orange	(6.0, 2.6)

Training Word Vectors

Traditional method uses **binary labels** based on the spatial distance between words.

We **hypothesise** that **temporal distance** is more **informative** that spatial distance.

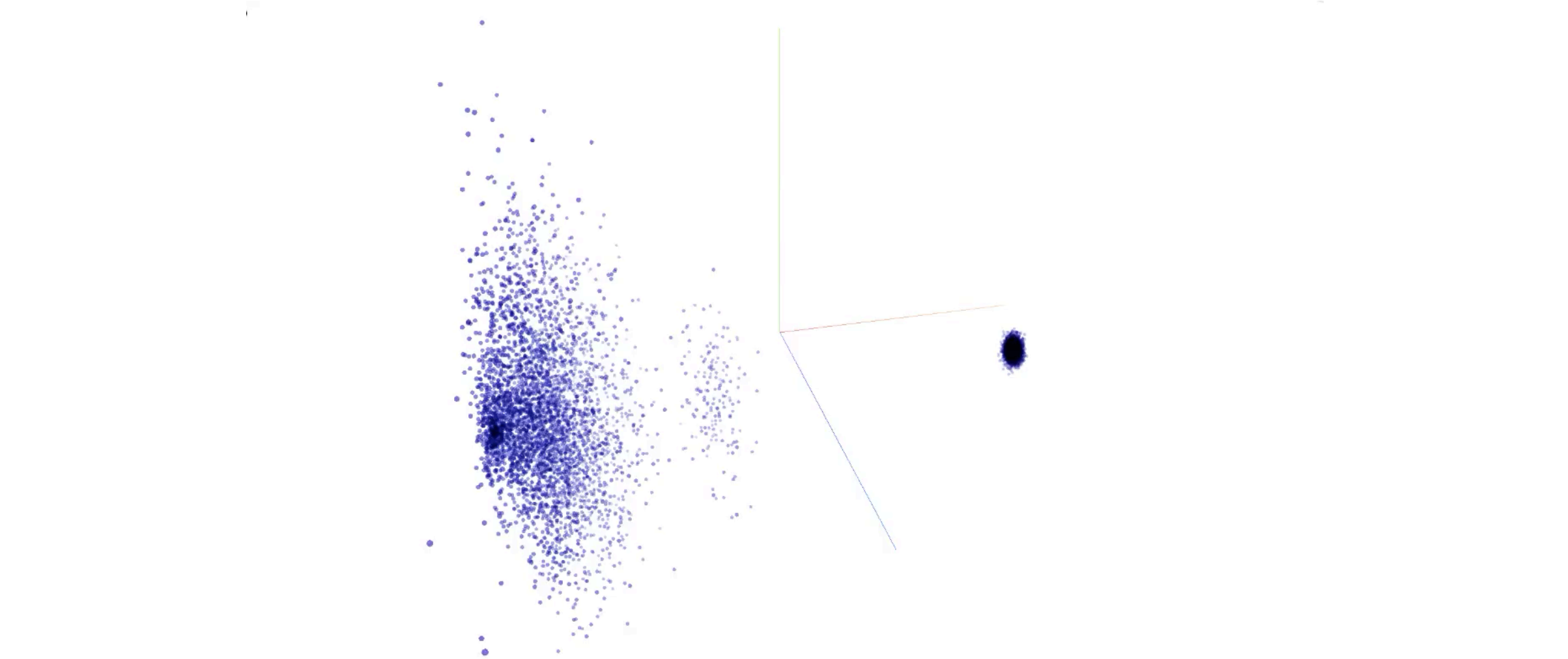
Therefore we **replace spatial** distance with **temporal** distance + use **scalar labels** rather than binary labels.

Not time to discuss this in **detail** here, if you are interested come and **speak to me.**

Time	User	Message
15	legrandmanithou	go arena
15	joeesbeast	4head
15	ninjaskruller	gachibass
15	lelfol123	mcconnell sleeping
16	derravia	4head
16	leonelghost	4head
16	scrundl3r	kreygasm
16	gwennova	lul
16	boynextdoorkreygasm	4head
16	majes1ic	4head
16	j0j0_	4head
16	itreek	4head
16	manaaddict42	4head
16	blazzerx	kreygasm
17	deathstr0ke_dc	lul lul

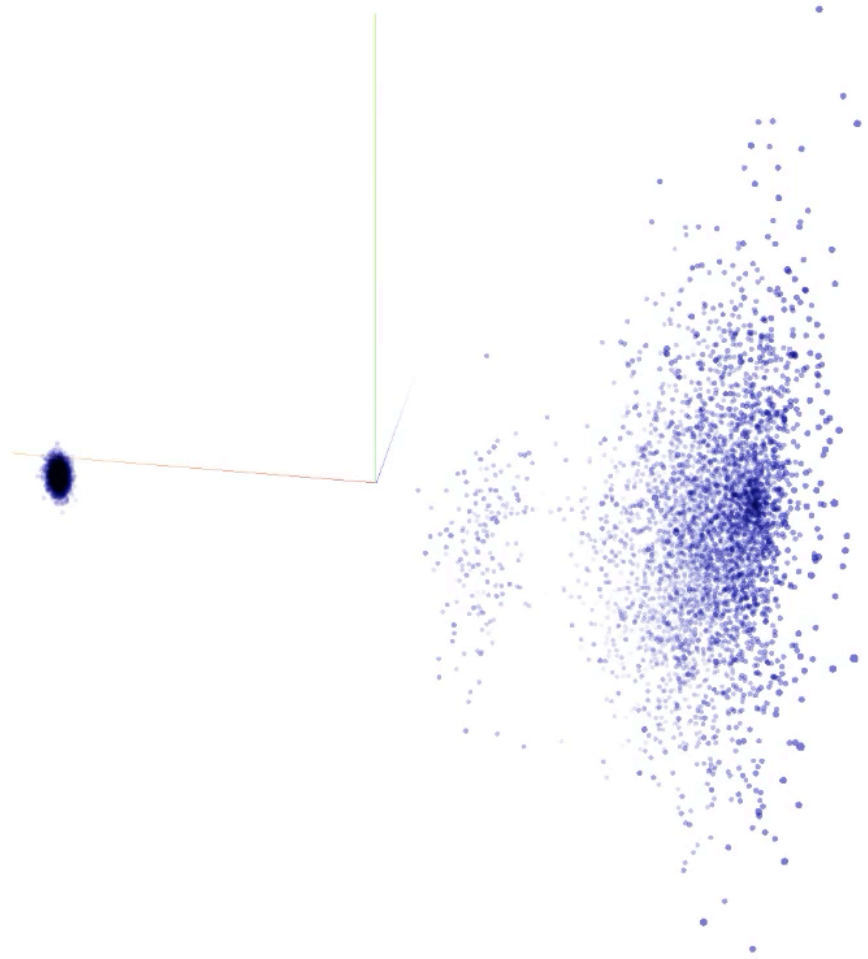
Standard Word Vector Space

Twitch Chat Word Vector Space



3. Cluster Analysis

Two distinct clusters



What are in these clusters?*

Blue Cluster

- 4330 Words
- Mo
- Lon
- Few
- 'Fas
- More repeated messages
- Higher average streamer popularity

Reactions and Memes?

Red Cluster

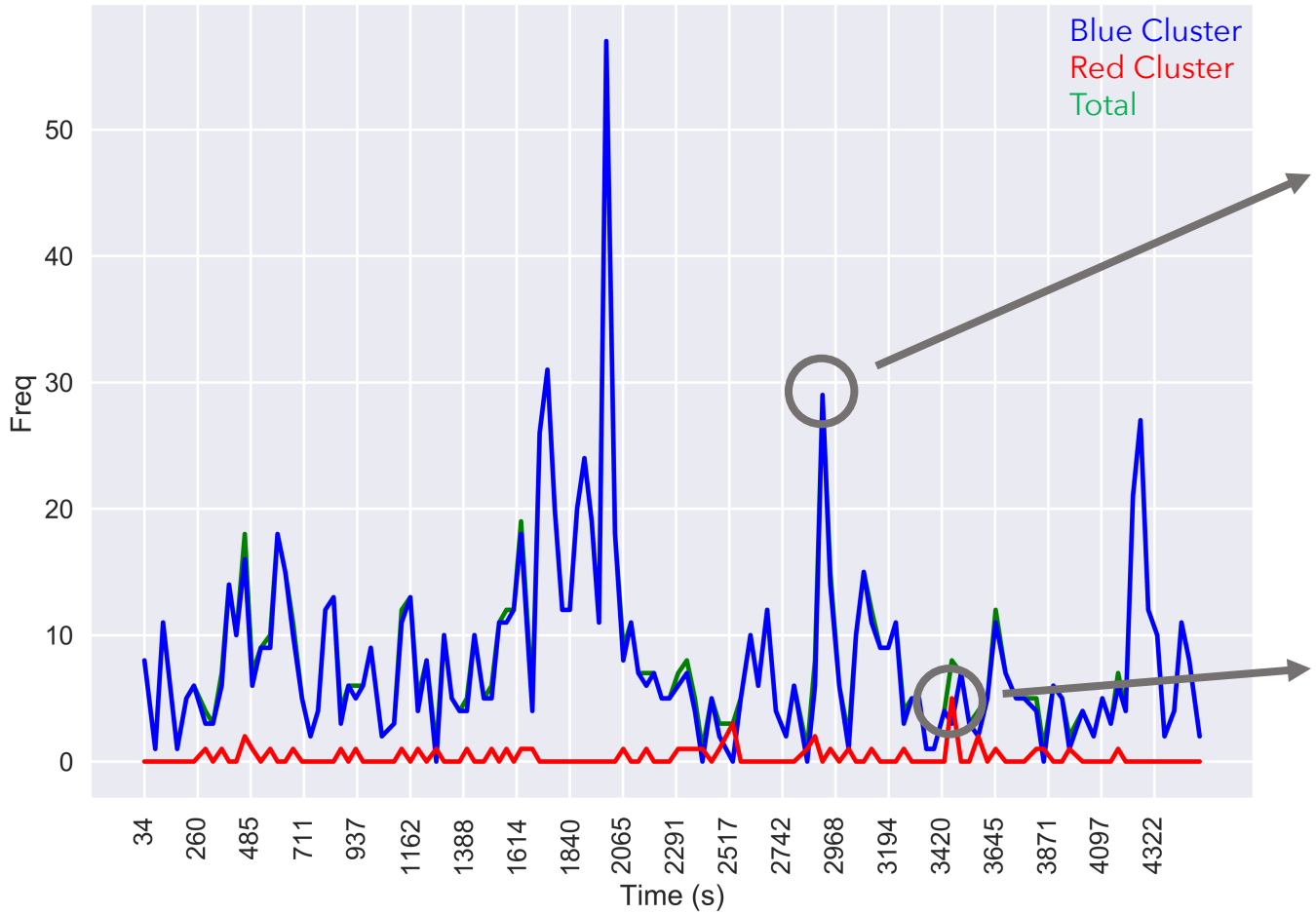
- 5735 Words
- Less fr
- Shorte
- More
- 'Slowe
- Fewer repeated messages
- Lower average streamer popularity

Discourse?

But, why these cluster are so separable (we don't know yet).

*Based on 100 words closest to each centroid. Statistical test not yet undertaken.

Messages over time



theweirdone__	omg
uchiha37	LUL
christachi	PogChamp
yxcvbnm96	PogChamp PogChamp PogChamp
theultjugg	calebdSkill calebdSkill
s_murph729	yellowhatFlag yellowhatFlag yellowhatFlag yellowhatFlag yellowhatFlag yellowhatFlag yellowhatFlag yellowhatFlag yellowhatFlag yellowhatFlag
dmaud3030	aaand ggs
gustavooliva	it shows
camzxlla	LOL
dcsports8	wow

edwincornrolls	eh his discard are kinda bricks now
ex_cathedra	generally one storm and one labman
chylith	they play 1 storm 1 lab man as a backup wincon
hoopyfreud	@Ereppy don't think so
Immoraloral	no only 1 storm and 1 lab man as a win con afaik
ticci_jikki_mirror_memer	@ereppy back up win con is lab man
Reborndrago	This is winning for Andrew right now
Immoraloral	too much density of card draw and combo protection
ex_cathedra	he can brutality storm to see if his thoughseize is bricked or not but that might be wasteful
Anamchara32	Death's Shadow is the good guy?

4. Conclusions

Where are we at?

Know your audience?

- Well not really … but this is a step towards understand chat.
- Viewer chat is clearly different to traditional text.

Improved vectorisation?

- We don't know yet.
- Hard to firmly evaluate because so much text is unknown.

Understanding text from vectors?

- Vector models have two distinct clusters but not certain why.
- Likely relates to users spamming reactions and memes vs partaking in discourse
- We can potentially uses these models to find both moments of excitement/interest and moments of discourse in the chat

What's Next?

Technique Development

- We ned a better understanding of the 'two cluster' finding.
- Can we robustly find interesting moments through analysing chat?
- Is there a link between vectors and sentiment?

Human evaluation

- 'Relatedness' tests tell us how good these models are.
- Since Twitch is such a new domain these cannot be done automatically, we need humans.

Incorporating these vectors into **Audio-Visual** models

- This is the primary goal, now we have these vectors what happen when we make Audio-Visual-Textual models?
- Is text chat a good predictive data-view or can it only be used a describe past events?

Thank You For Listening!

Questions?

Charlie Ringer | @charlieringer