# Voting Mechanism and Consensus Involving

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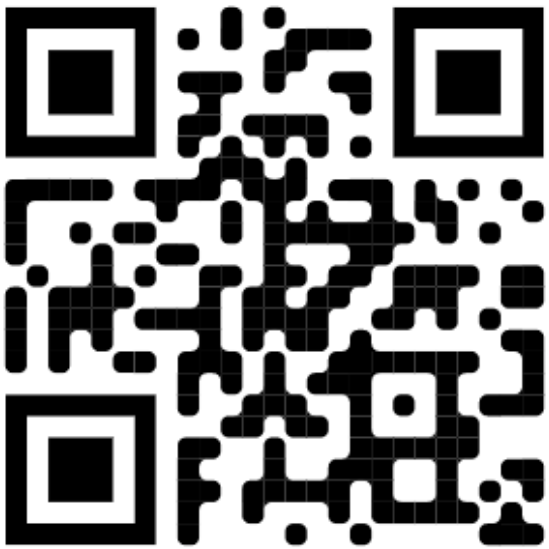
# Lets Do a Experimentation Before We Start

**Polis**

- Link: https://pol.is/2hkcy8chhj
- Topic: **China Zero Covid Protests**
- 
  - User can agree / disagree on different comments
  - Its **anonymous!!**.
  - Based in the US
  - $\rightarrow$ *youwon't blacklist*!!



# Outline

- Motivation
- Research Questions
- Data
- Methods
- Results thus far
- Limitations/Next Steps

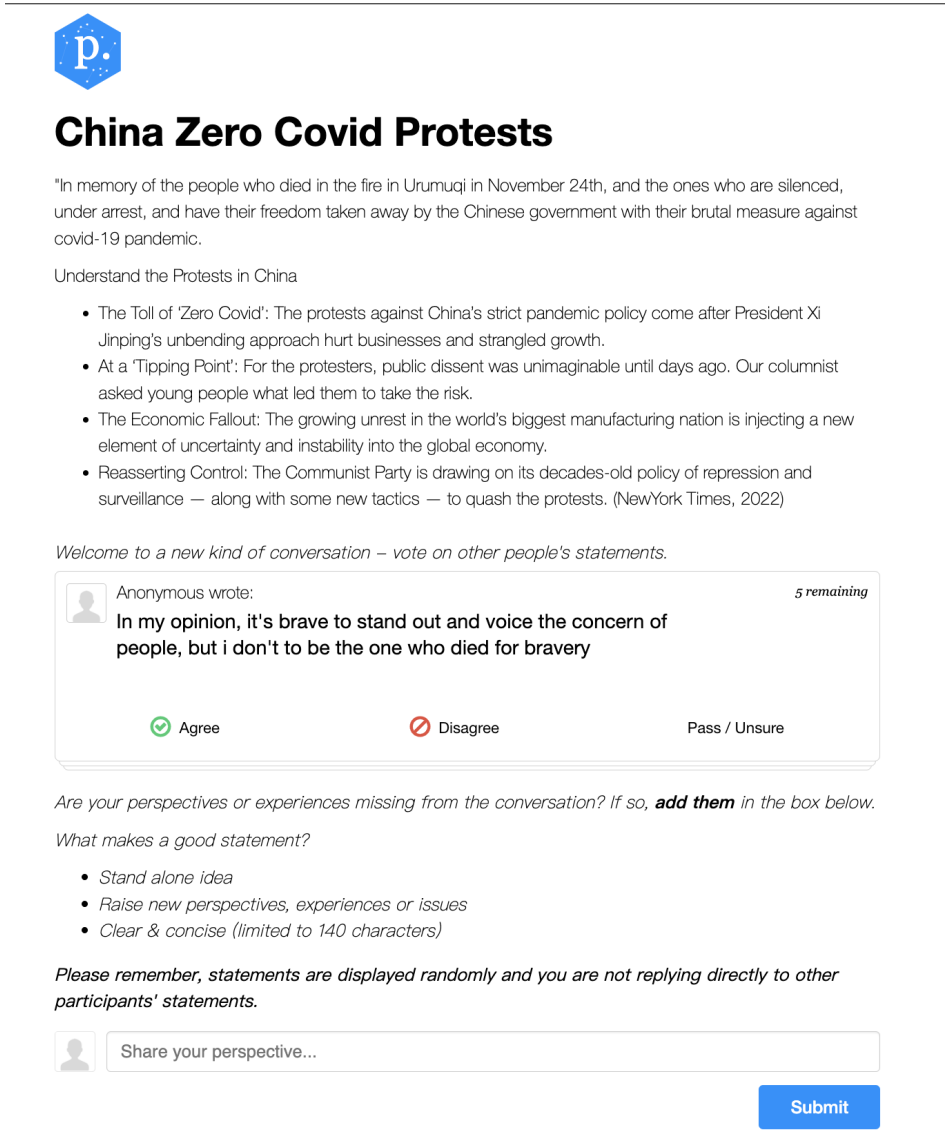
# Motivation

- Problems
  - 1.'Horse race' problem and misinterpretation in polls and probabilistic modeling
  - 2. Echo chamber and polarization
  - 2. No alternative voice in some authoritarian countries
- Solution
  - Voting mechanism served as decentralized opinion aggregation platform
  - Vote on the "comments" by participants
  - Review and understand the most trivial concern of the other side

# Prior Research

**Polis**

- a real-time system for gathering, analyzing and understanding what large groups of people think in their own words, enabled by advanced statistics and machine learning.
- method:
  1. Read about the polis opinion matrix
  2. Dimensionality reduction
  3. Clustering



# Research Questions

- Observation
  - Static: Opinion landscape of the participants and representativeness of comments
  - Dynamic: Is a consensus forming in the voting?
- Activism
  - Would prioritizing the comments from the opposite 'echo chamber' make a difference?

# Data Sources

- Vtaiwan open source data
  - Experimentation of voting mechanism (45s test)
  - Uber Issue: Should Uber be regulated in Taiwan
  - Main data set: participants vote csv, comment csv

# Method: Data Acquisition

- participants-votes.csv
  - meta-data: participant, group-id, n-comments, n-notes, n-disagree, n-agree
  - sparse matrix: participants (x-axis) vote on each comments (y-axis)
- comments.csv
  - variables: comment-id, author-id, moderated, comment-body, timestamp

# Method: Process flow

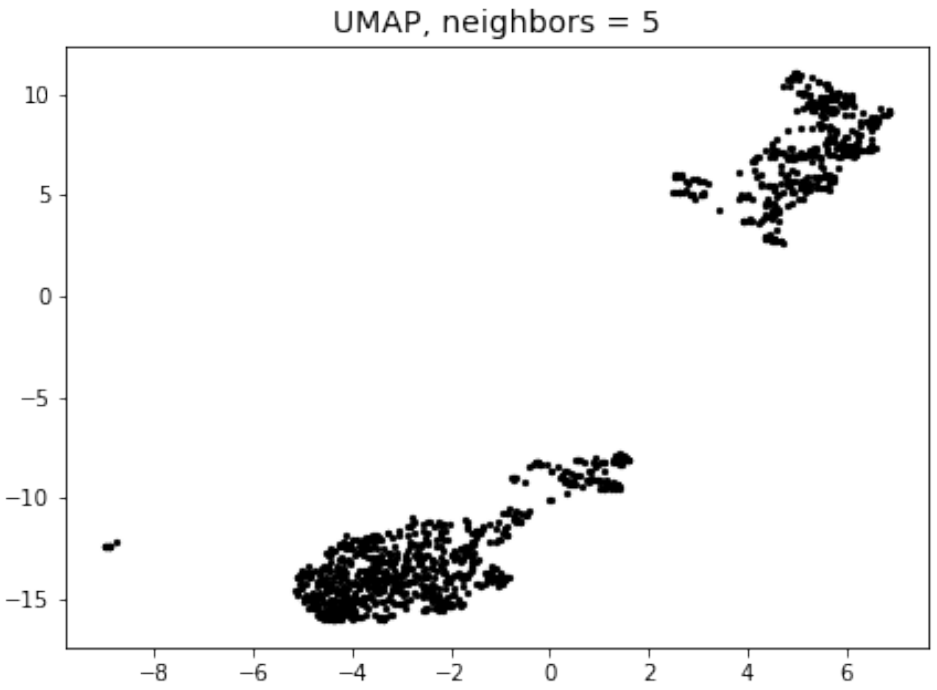
1. Data Clean
2. Dimensionality reduction:
   - PCA
   - UMAP
3. Cluster:
   - Kmean

# Method: Data Cleaning

```
def count_finite(row):
    finite = np.isfinite(row[val_fields])
    return sum(finite) # count number of True values in `finite`

def select_rows(df, threshold):
    number_of_votes = df.apply(count_finite, axis=1)
    valid = number_of_votes >= threshold
    return df[valid]
df_votes = select_rows(df, 7)

## remove statements (columns) which were moderated out
statements_all_in = sorted(list(df_comments.loc[
    df_comments["moderated"] > 0].index.array), key = int
    )
```

# Methods: Algorithms

- process flow
- Dimensionality reduction
  - PCA
  - UMAP
- Clustering
  - Kmeans



# Methods: Dimension reduction

- enables us to visualize participants in relation to each other within the opinion landscape
- Participants are closer together in this landscape if they tend to agree. And further apart if they tend to disagree.

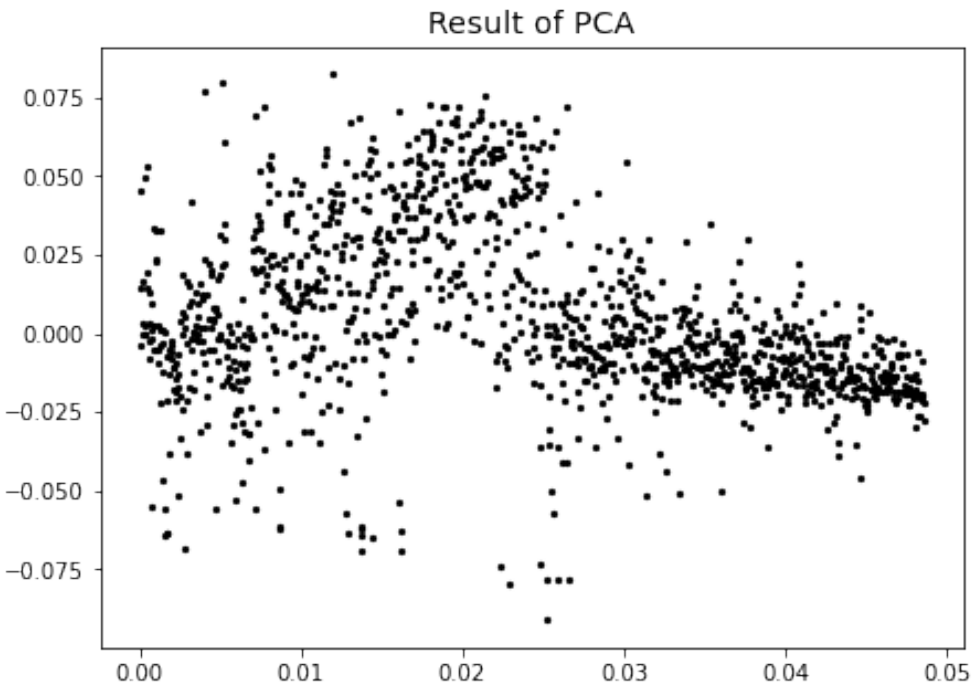



Abbildung 1: Visualize w/ PCA

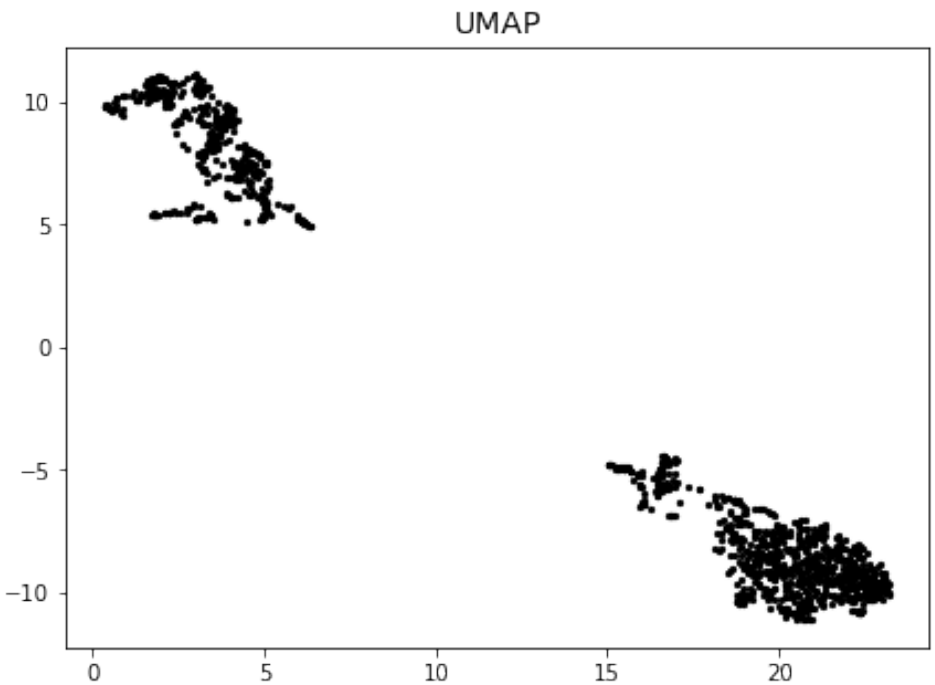



Abbildung 2: Visualize w/ UMAP

# Methods: Dimension reduction

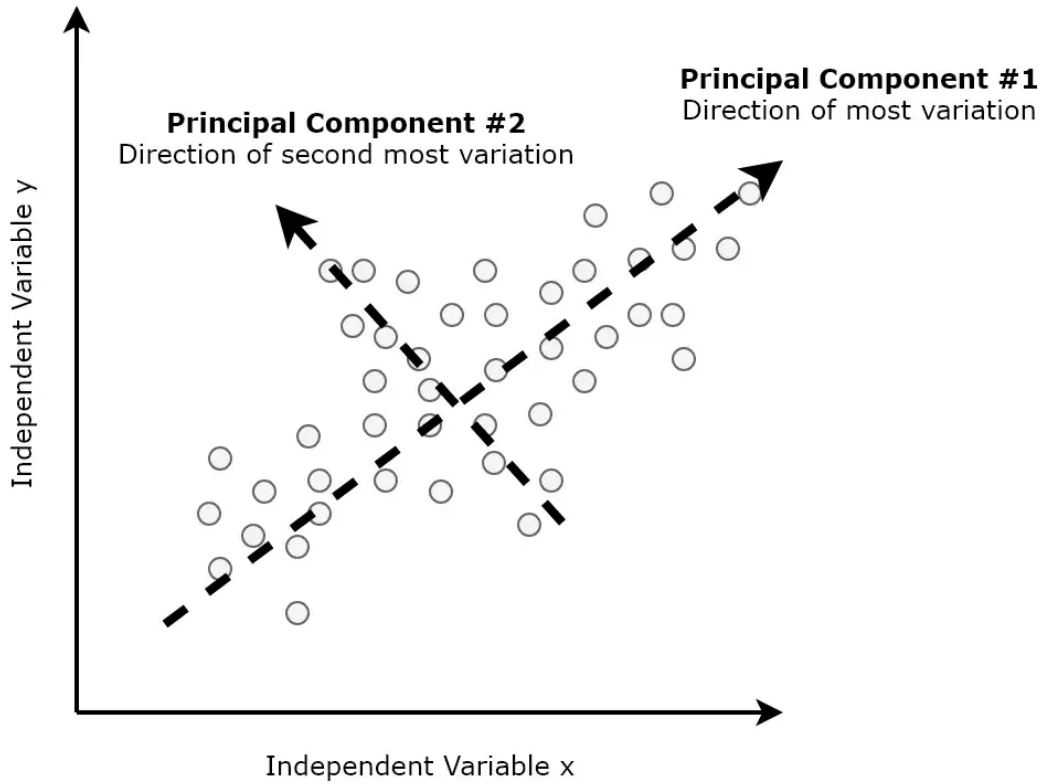
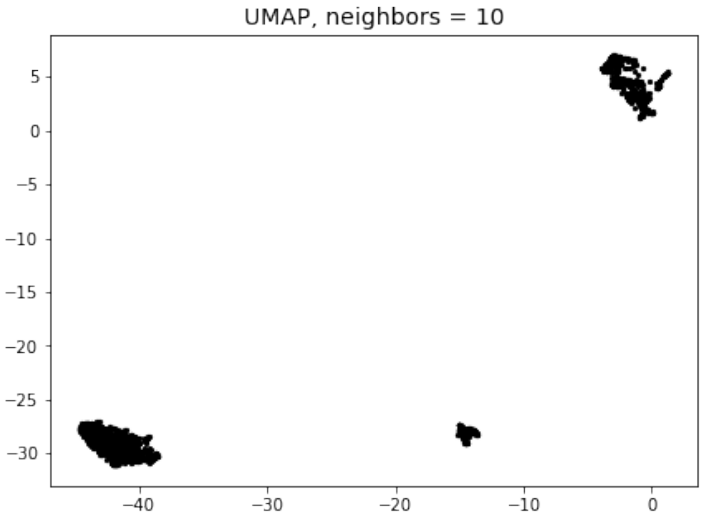
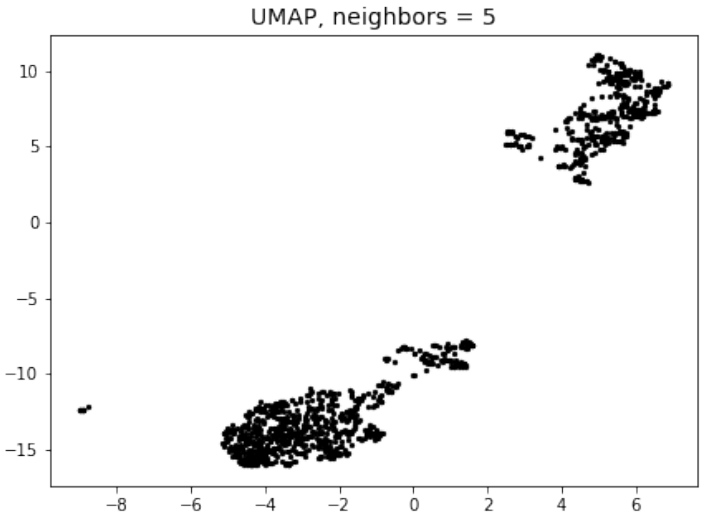



Abbildung 3: Source: Packt_Pub, via Hackernoon

- PCA
  - effective for visualizing clusters or groups of data points and their relative proximities.
  - Identifying the hyperplane which lies closest to the data and then

# Methods: Dimension reduction




- UMAP (Uniform Manifold Approximation and Projection)
  - effective for visualizing clusters of data points.
  - nonlinear dimensionality reduction method
  - Scalability: can be applied directly to sparse matrices

# Methods: K-means

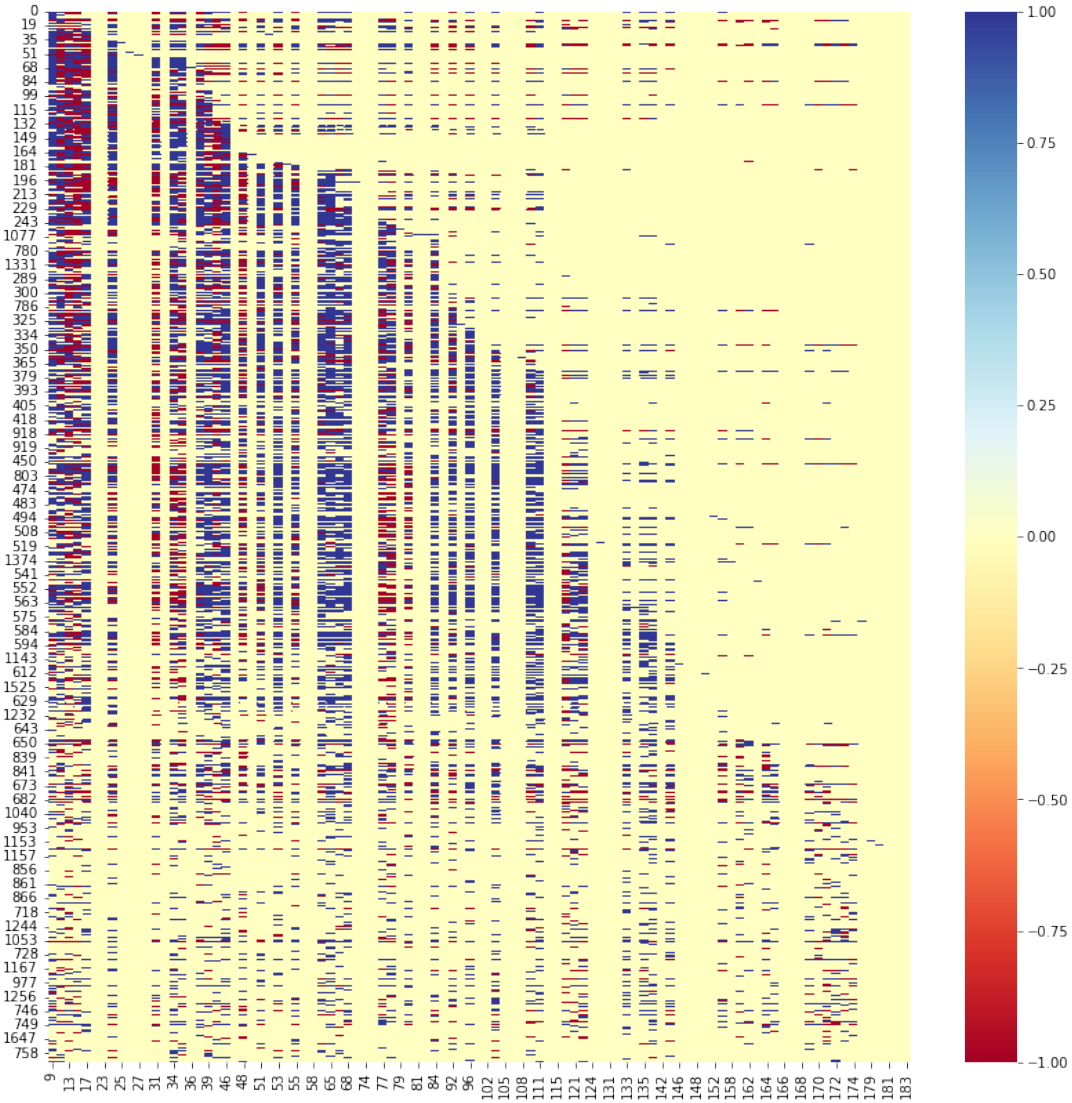
- Algorithm
  1. Randomly initialize k cluster means (here: k $= 2$)
  2. Iterate:
  3. Assign each object to the nearest cluster mean
  4. Recompute cluster means
  5. Stop when clustering converges

```
def kmean_get_grouped(embeds, k):
    grouped_embed = KMeans(n_clusters=2, r
    grouped_embed = grouped_embed.fit(embe
    labs = grouped_embed.labels_

    A_key = np.where(labs == 0 )[0]
    B_key = np.where(labs == 1 )[0]
    return A_key, B_key
```

# Describing the analytic sample

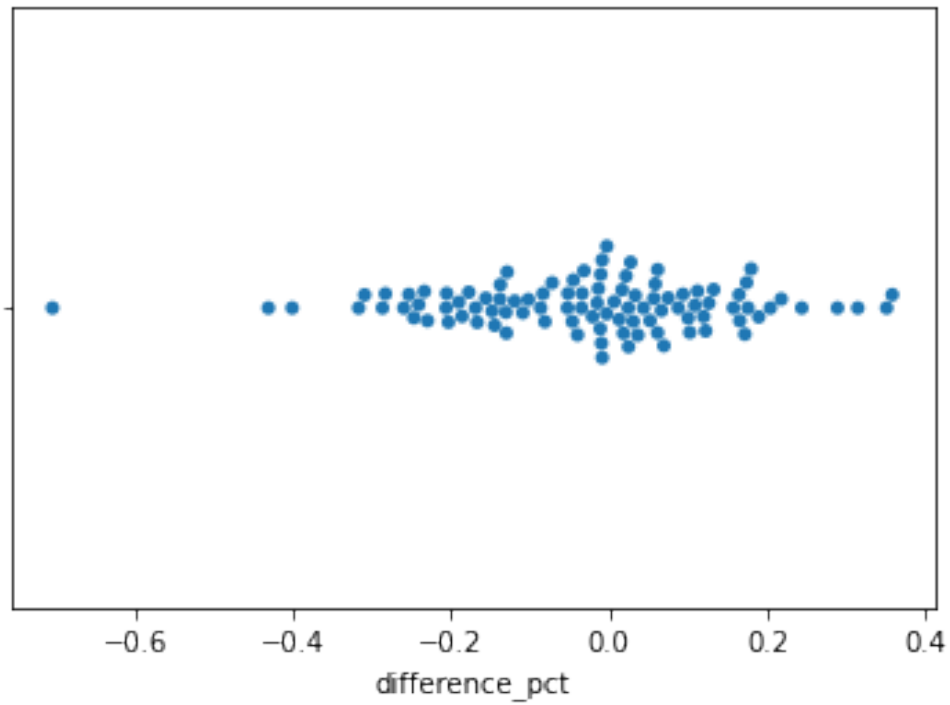
| Name | Estimand |
|---|---|
| Dimensions of pre-processed matrix | (1921, 203) |
| Dimensions of post-processed matrix | (1269, 198) |
| Total number of possible votes | 251262 |
| Total number of agrees | 30237 |
| Total number of disagrees | 11661 |
| Total without vote | 208097 |
| Percent sparse | 0.8282072100039003 |

# Full participants * comments matrix



# Results: Divisiveness of Comments

- How divisive was the conversation?
- Statement close to zero are voted on the same way - either both opinion groups agree or disagree
- Statement far from zero are divisive - participant were split between agreement and disagreement



# Results: Consensus Comments

| | comment-id | author-id | a_agree | a_disagree | a_support_share | b_agree | b_disagree | b_support_share | comment-body |
|---|---|---|---|---|---|---|---|---|---|
| 107 | 94 | 0 | 122 | 46 | 0.452381 | 163 | 61 | 0.455357 | 我覺得要提前考慮電腦自動駕駛的情況，包括現代大眾系統是否還有興建必要，以及以後計程車司機的就... |
| 165 | 141 | 258 | 91 | 11 | 0.784314 | 101 | 12 | 0.787611 | 我覺得繳稅是一個企業在台灣經營的義務，Uber或其新創模式再麼優秀，在台灣的所得都應該要盡到... |
| 95 | 150 | 2938 | 73 | 11 | 0.738095 | 71 | 11 | 0.731707 | 應修改讓自用車的乘客保險也能保障乘客的權益或由UBER統一投保 |
| 49 | 32 | 0 | 194 | 106 | 0.293333 | 222 | 119 | 0.302053 | 我覺得 UberX 目前無法幫乘客保意外險，讓我感到沒有保障。 |
| 65 | 50 | 0 | 118 | 126 | −0.032787 | 142 | 149 | −0.024055 | 我覺得大眾運輸工具普及後，營業車的空車率已不斷攀升，開放自用車載客不會擴大需求，只會讓計程車... |

- min 'support share difference' on each comments
  - smaller difference in support share $\rightarrow$ *consensus*
- Consensus arguments
  - Main appeal of people (agreed by both groups)

# Results: Dispute Comments

| | comment-id | author-id | a_agree | a_disagree | a_support_share | b_agree | b_disagree | b_support_share | comment-body |
|---|---|---|---|---|---|---|---|---|---|
| 179 | 13 | 0 | 85 | 245 | −0.484848 | 195 | 125 | 0.218750 | 我覺得計程車身一定要塗裝成黃色的，和其他車輛顏色不同。 |
| 51 | 37 | 0 | 178 | 92 | 0.318519 | 286 | 41 | 0.749235 | 我覺得在徵集意見前，各級相關政府單位都應該先明確表示立場。 |
| 66 | 51 | 476 | 172 | 60 | 0.482759 | 269 | 30 | 0.799331 | 我覺得任何的創新服務以達營利目的的確是社會進步的重要過程，但必須完全在法律的規範下合法經營，... |
| 108 | 96 | 0 | 128 | 26 | 0.662338 | 240 | 24 | 0.818182 | 我覺得所有營業車輛都應該一律採取乘客評分機制，而不是只靠政府核發營業許可。 |
| 47 | 30 | 0 | 48 | 237 | −0.663158 | 125 | 214 | −0.262537 | 我覺得 UberX 現行不法行為應盡一切努力使其停業，不需要國人表示意見。 |

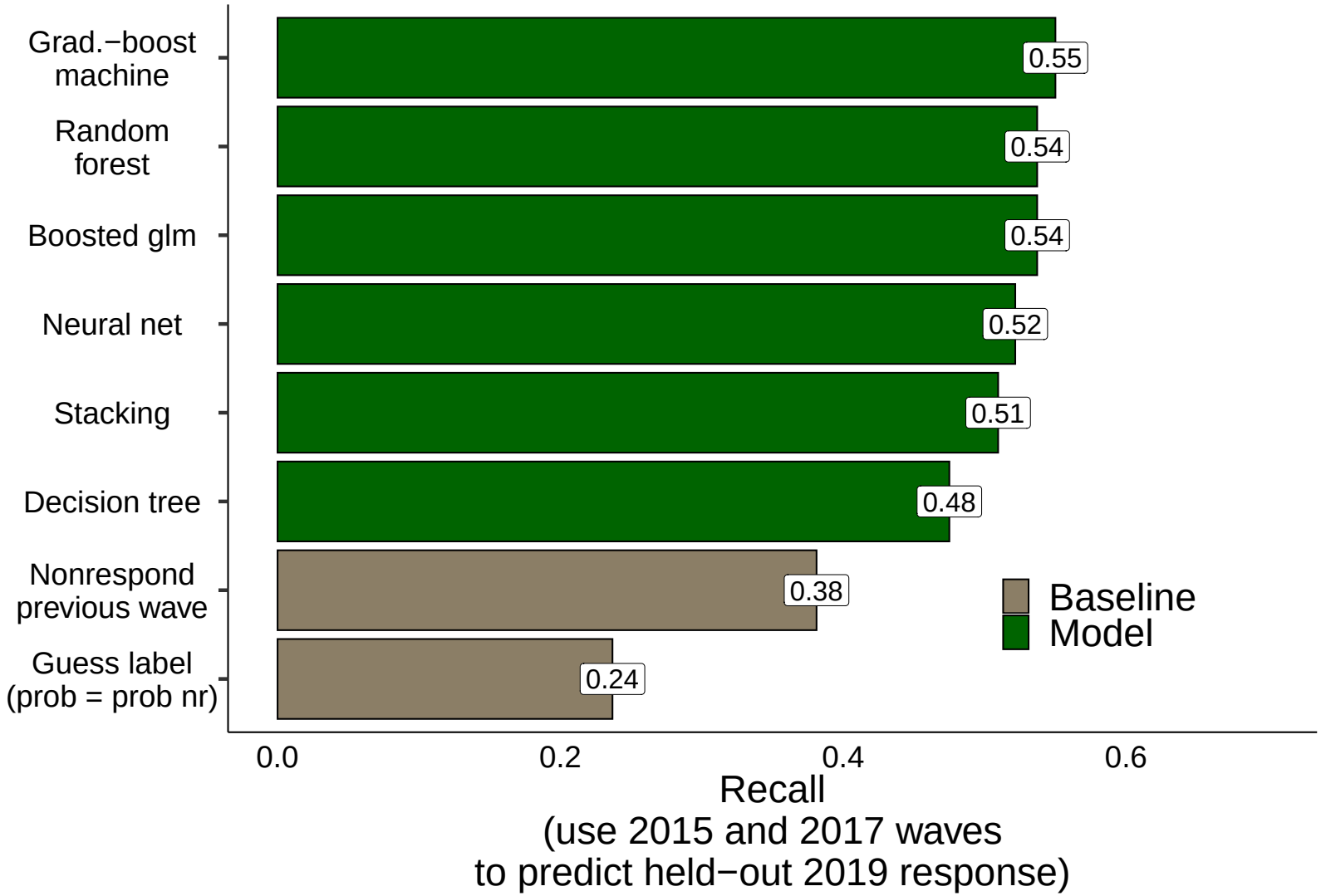
- max 'support share difference' on each comments
  - larger difference in support share dispute
- Dispute arguments
  - Need to be discussed and solved

# Next step

- Dynamic analysis
  - time-series hypothesis testing
  - 4 sub-graphs, calculate the social distance of opinion group A and B
- Limitation
  - clustering method produce different result
  - testing leiden-graph method

Here are some slides that have examples of different syntax you may find helpful (not required to do things like a tikz diagram)

# Example of loading a figure you've uploaded (can be pdf or png)



# Example of a table

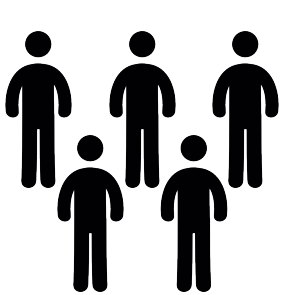
| Name | Estimand | Estimator | Why? |
|---|---|---|---|
| Divergence between sample and population | $(\bar{X} - E[\hat{\bar{X}} \mid T = 1]) - (\bar{X} - E[\hat{\bar{X}} \mid T = 0])$ | Regress distance between population mean $(\bar{X})$ and sample mean $(\hat{X})$ on treatment indicator | Measures whether treatment produces sample quantities closer to population mean |
| Response rate | $\frac{1}{n}\sum_{\{i:S_i=1\}} Y_i(T = 1) - Y_i(T = 0)$ | Regress response on treatment | In combination with bias measure helps us understand whether we increase both response rate and decrease non-response bias, or only increase response rate with no reductions in bias |

# Example of inserting code snippet using fragile environment and listings

```
def clean_yelp_json(one_biz):

    ## restrict to str cols
    d_str = {key:value for key, value in one_biz.items()
    if type(value) == str}

    df_str = pd.DataFrame(d_str, index = [d_str['id']])
    return(df_str)

yelp_stronly = [clean_yelp_json(one_b)
        for one_b in yelp_genjson['businesses']]
yelp_stronly_df = pd.concat(yelp_stronly)
```

# Example of splitting slide using minipage and tikz diagram

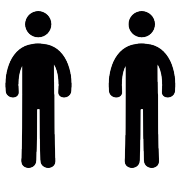
**Random targeting:**



Potential respondents

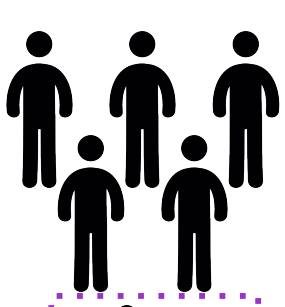


Randomly sample

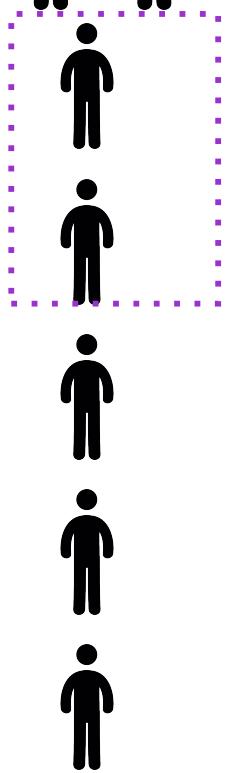


Provide additional incentives

**Risk-based targeting**



Potential respondents



1. Define estimand
2. Predict that label
3. Rank by $\hat{y}$
4. Provide additional incentives based on risk/importance

to predict (e.g., nonresponse risk; case importance)

# Another example tikz diagram