UNIVERSITY
OF OSLO

Analysing Public Sentiments towards Wind Energy in Norway

Alexandra Wittemann

November 29th, 2021

University of Oslo

Project and funding

UiO:Energy

Project and funding

A machine learning approach to analysing public sentiment towards wind energy in Norway

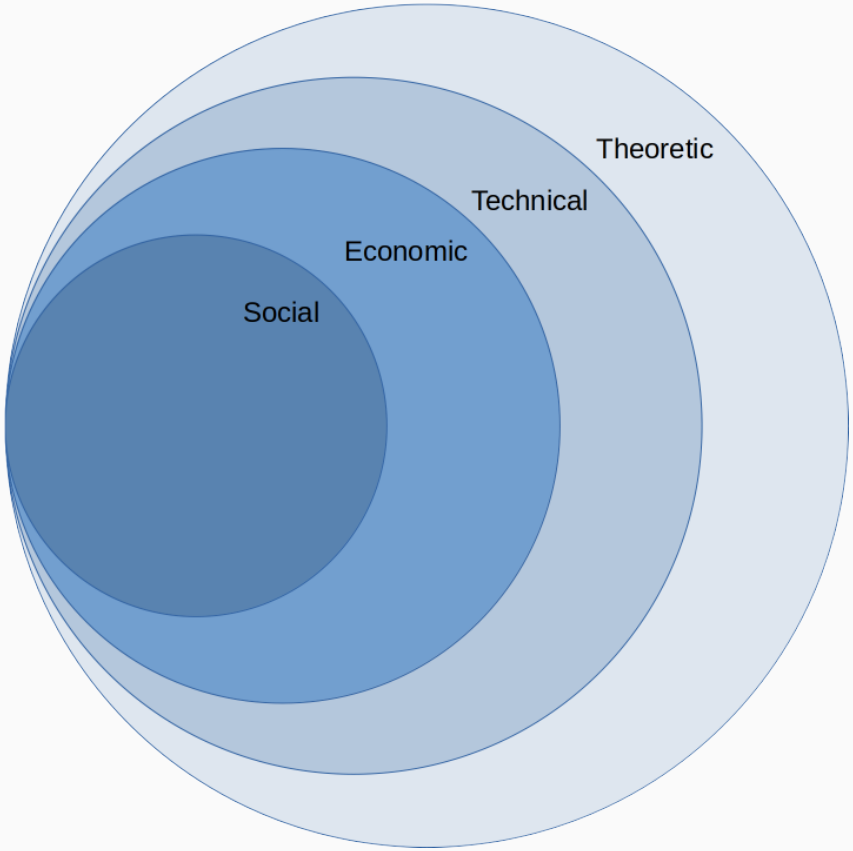
Modelling with social data

Incorporating social aspects of energy systems in energy systems modelling is receiving increasing attention.

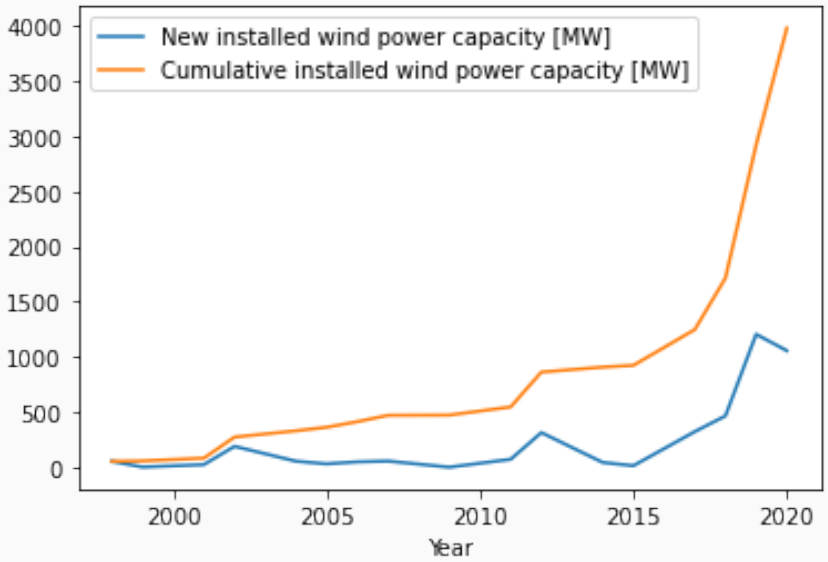
- Spatial analysis
  - The rising field of energy geography
  - Distribution of renewable energy technologies
- Social acceptance of renewable energy
  - Landscape aesthetics and scenicness
  - Constructed scenarios

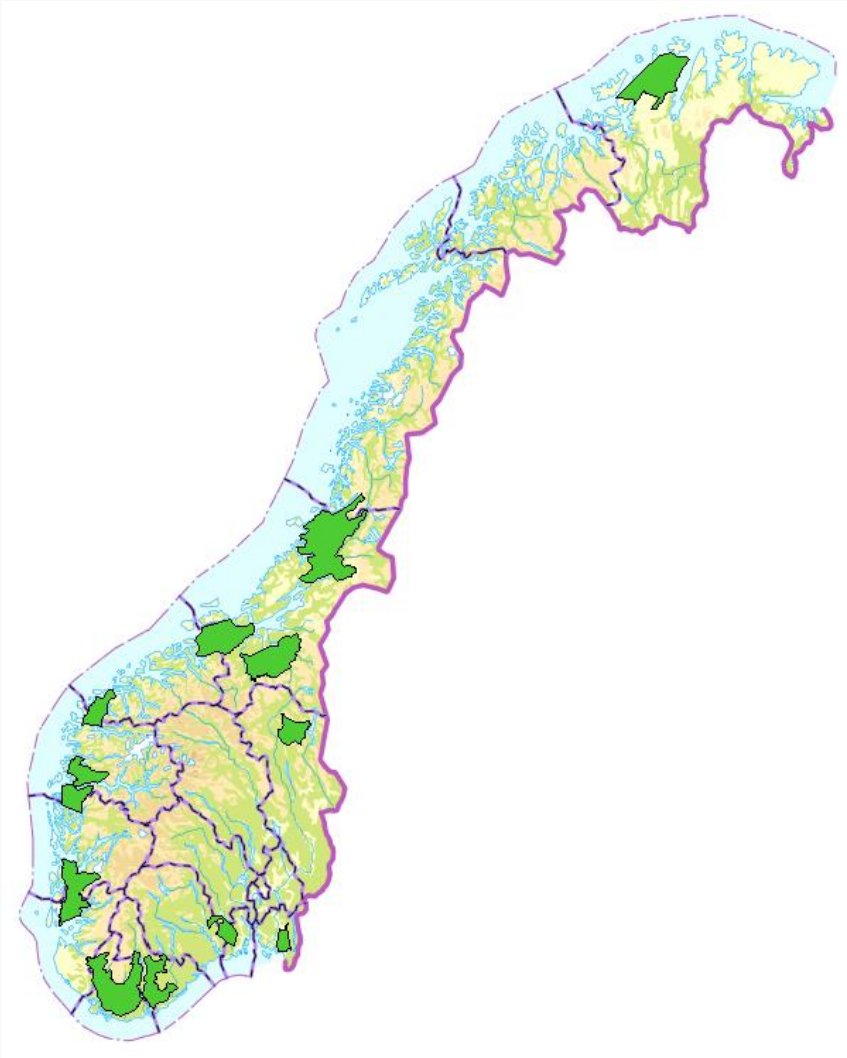
Social acceptance

- Not only about the ”NIMBY-factor”
  - perceived fairness
  - inclusive processes
  - distribution of benefits and burdens
- Important for the realisation of energy transitions



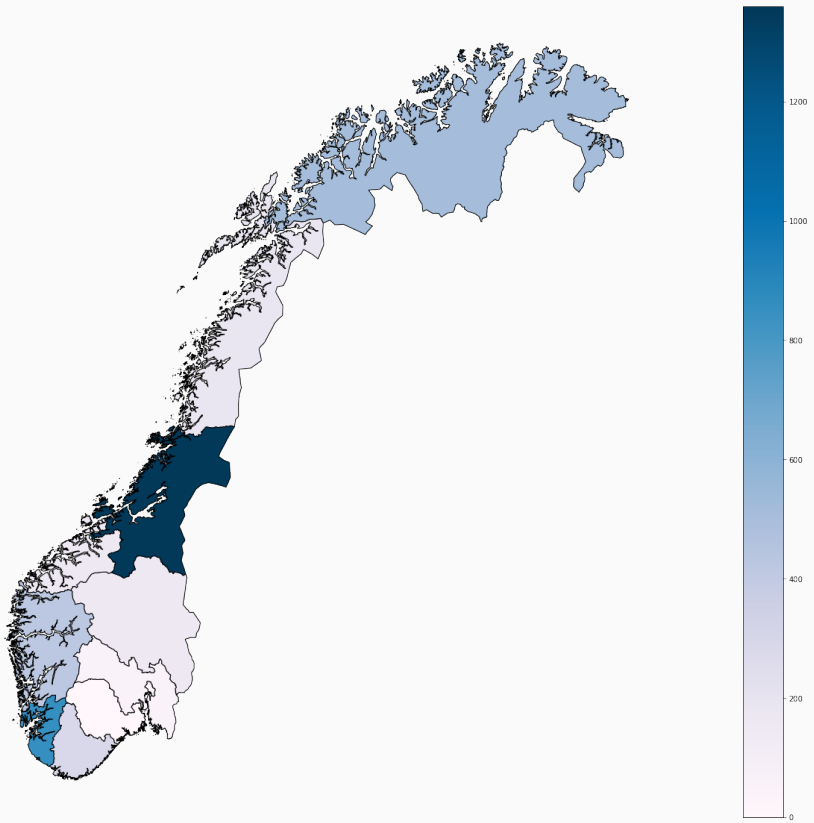
Wind power in Norway



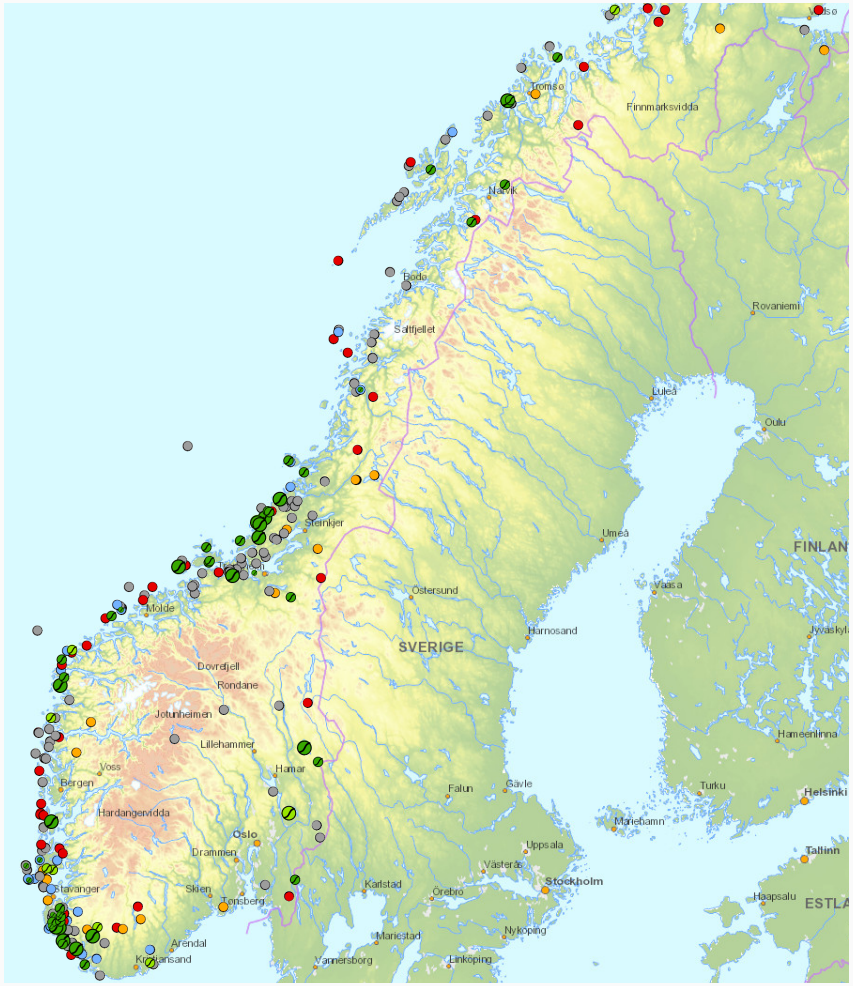


13 most suitable areas for wind power in Norway (The Norwegian Water Resources and Energy Directorate, 2019)

Wind power in Norway

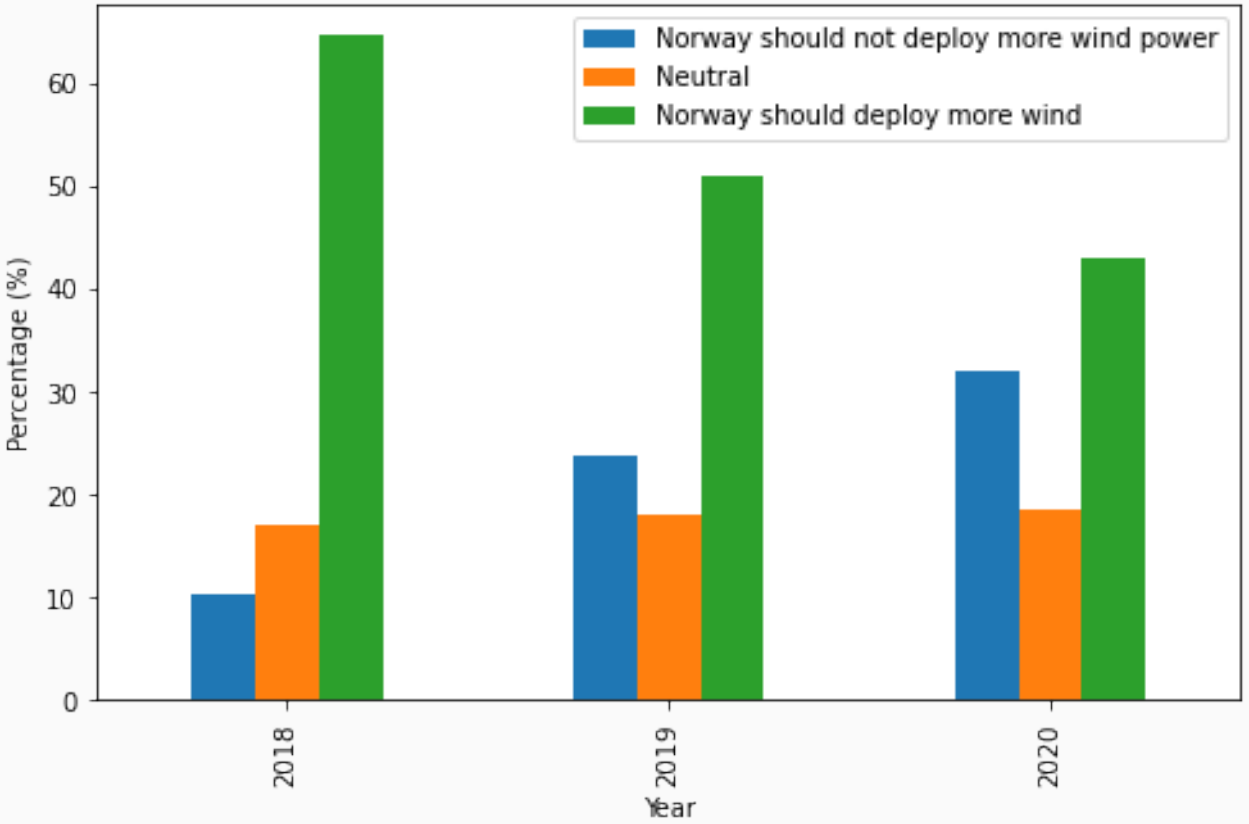


Installed wind power by county



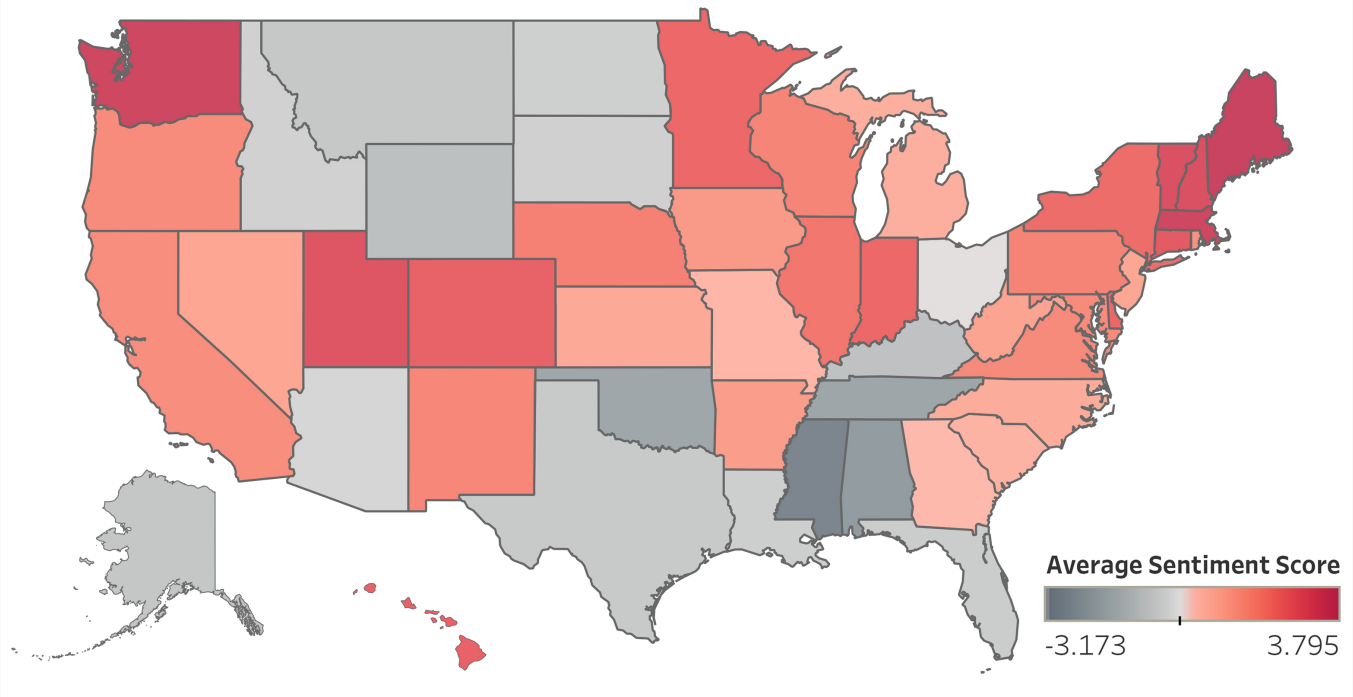
https://temakart.nve.no/tema/vindkraftverk

Surveying wind power sentiments



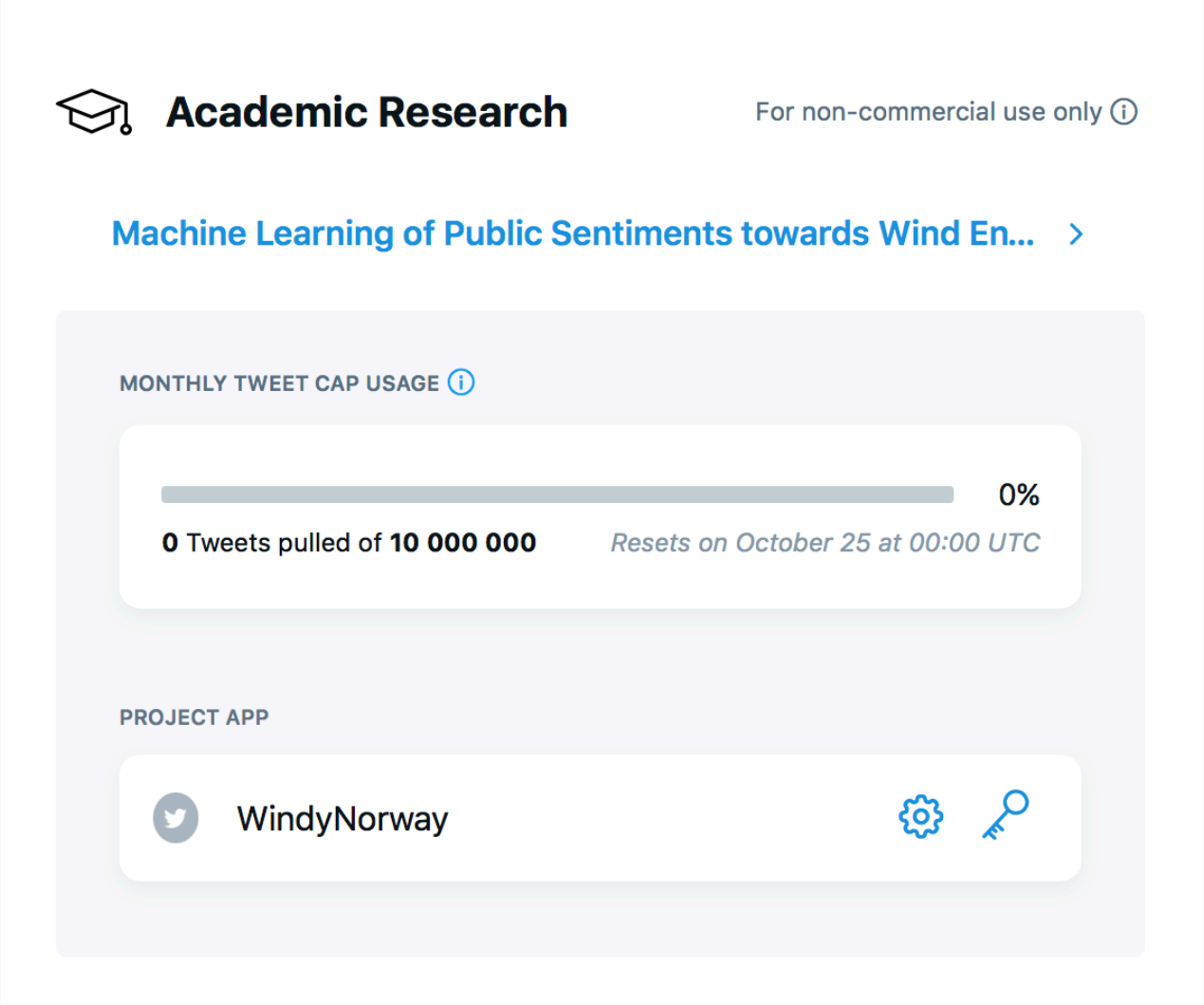
Reconstruction of surveying by CICERO (2019;2020)

Public Sentiment toward Solar Energy—Opinion Mining of Twitter Using a Transformer-Based Language Model



Spatial patterns in sentiment toward solar energy across the United States (Kim et al., 2021)

Data collection

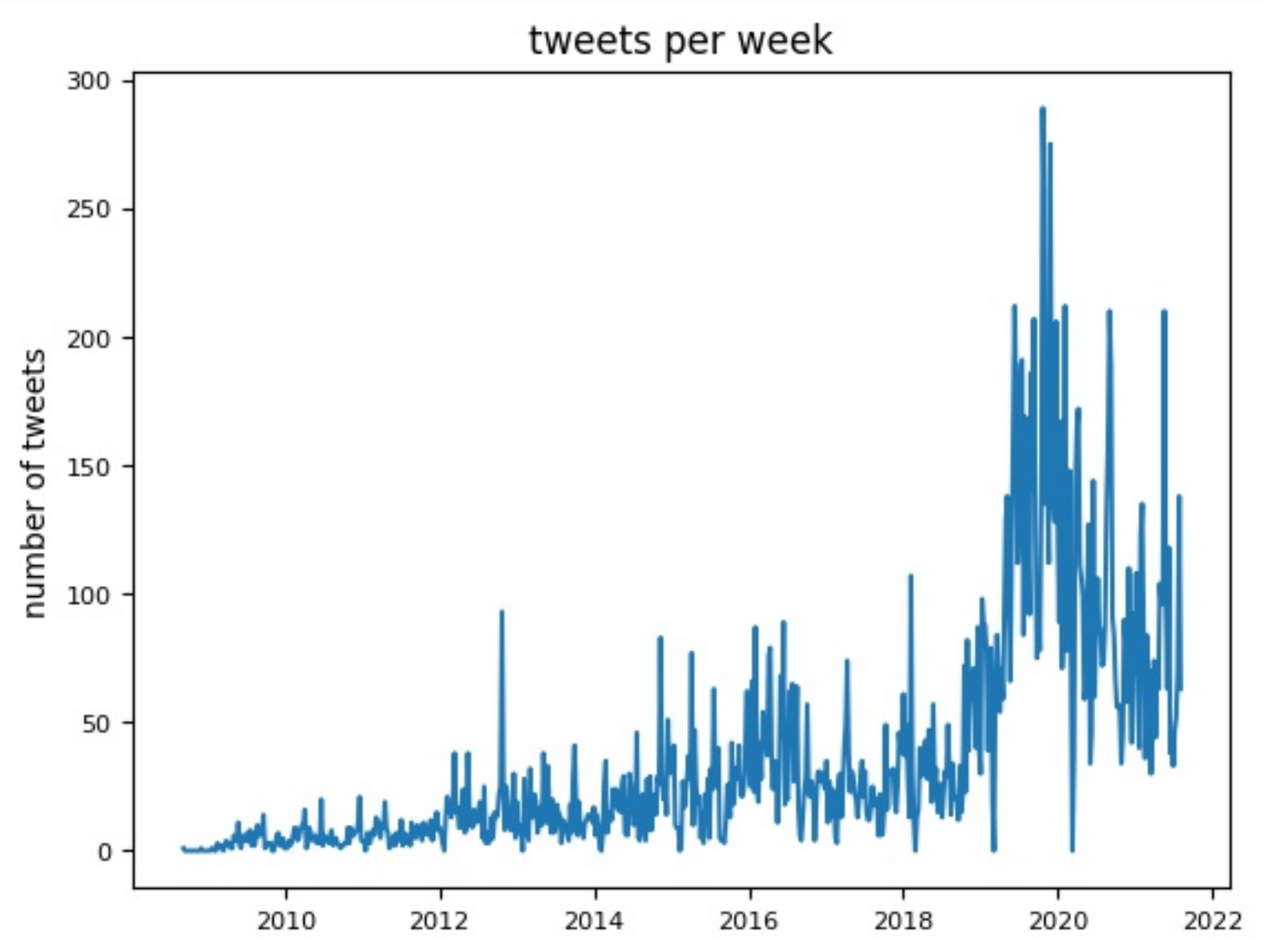


Data collection contd.

- Tweets older than nine days
- Tweets with has:geo-feature
- Tweets with lang:no-feature
- Keywords

Norwegian	English
Havvind	*Offshore wind*
Havvinden	***The** offshore wind*
Vindenergi	*Wind energy*
Vindkraft	*Wind power*
Vindkraften	***The** wind power*
Vindmølle	*Windmill*
Vindmøller	*Windmill**s***
Vindturbin	*Wind turbine*
Vindparkutbygging	*Wind farm development*
Vind	*Wind*

Data collection contd.



The annotation process

Jeg elsker offshore vindkraft

I love offshore wind power

Sol ja, men jeg vil ikke bo i et hus med vindmøller på taket! #bråk

Sun sure, but I don't want to live in a house with windmills on the roof! #noise

Vil vi ha mer fornybar energi må vi tåle noen vindmøller, selvom de er stygge.

If we want more renewable energy, we must tolerate some windmills even though they are ugly.

Godt skrevet! Det er gode argumenter både for og mot mer vindkraft i Norge. https://t.co/qeeYwcytno

Well written! There are good arguments for and against more wind power in Norway. https://t.co/qeeYwcytno

The annotation process contd.

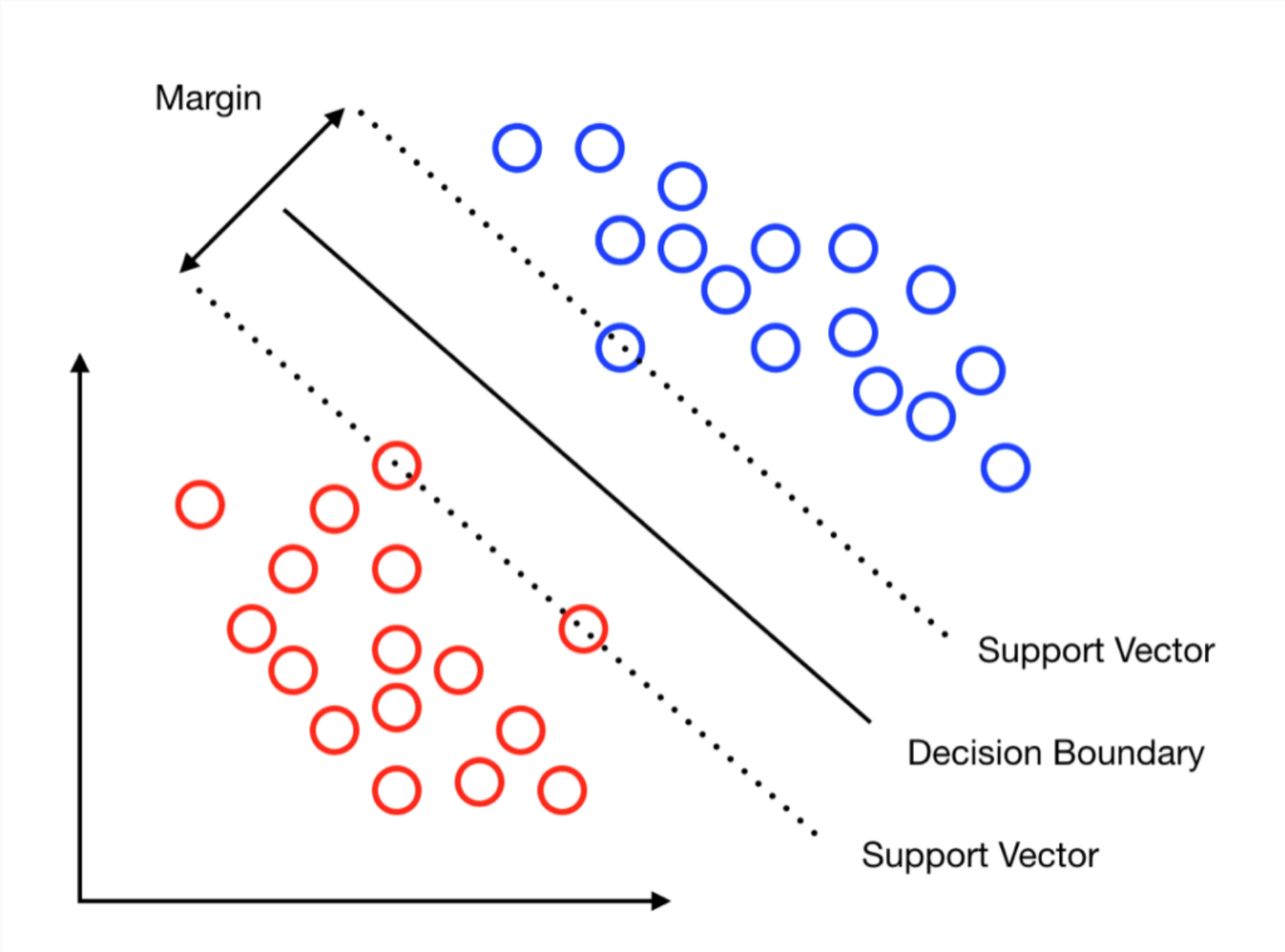
Debatt | Vindkraft

Klimaeliten forstår ikke vindkraftmotstanden | Lars H. Gulbrandsen

Lars H. Gulbrandsen
forskningsleder, Fridtjof Nansens Institutt

6. april 2020

Baseline and SVM



Finetuning NorBERT

Compute

Instances

Used 2 of 20

VCPUs

Used 8 of 40

RAM

Used 32GB of 64GB

Volume

Volumes

Used 0 of 20

Volume Snapshots

Used 0 of 40

Volume Storage

Used 0Bytes of 200GB

Network

Security Groups

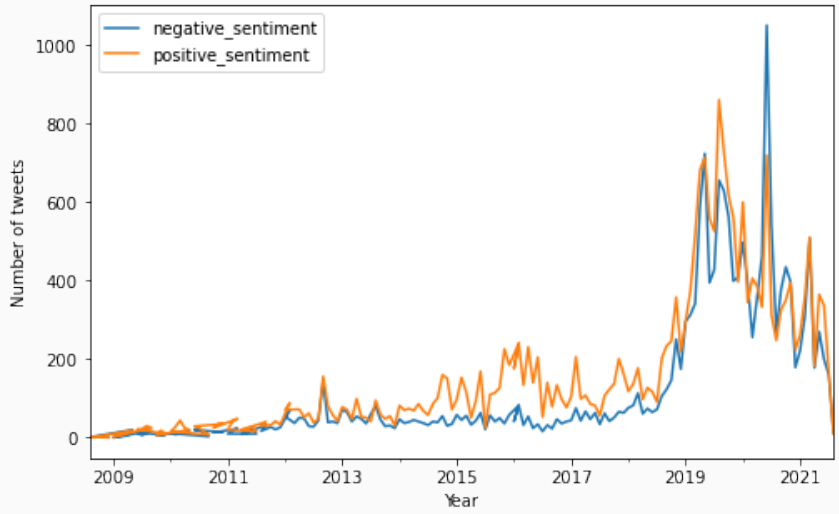
Used 3 of 40

Security Group Rules

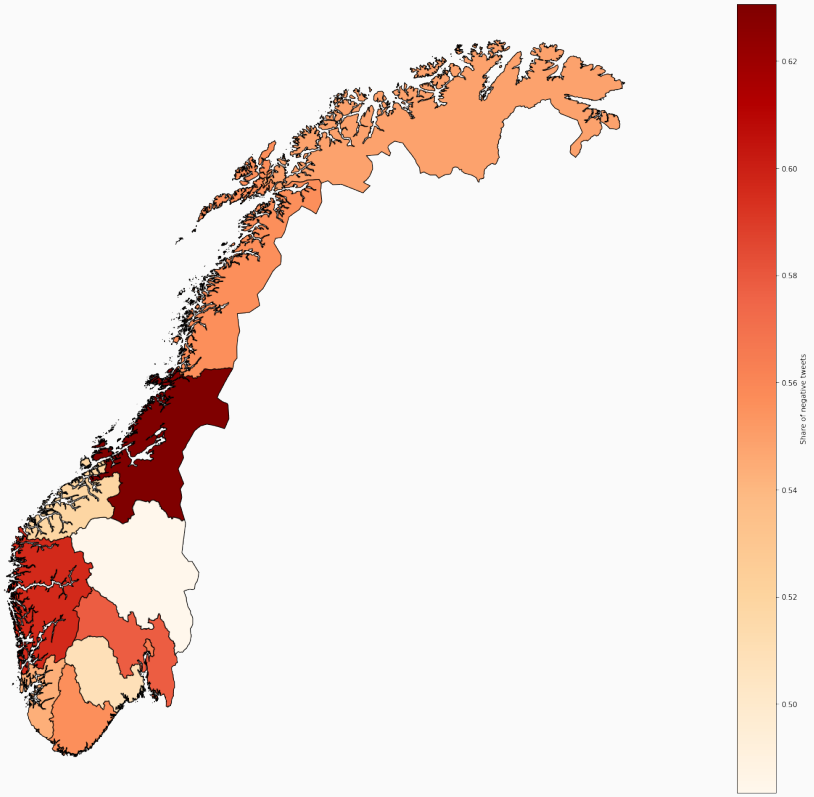
Used 16 of 400

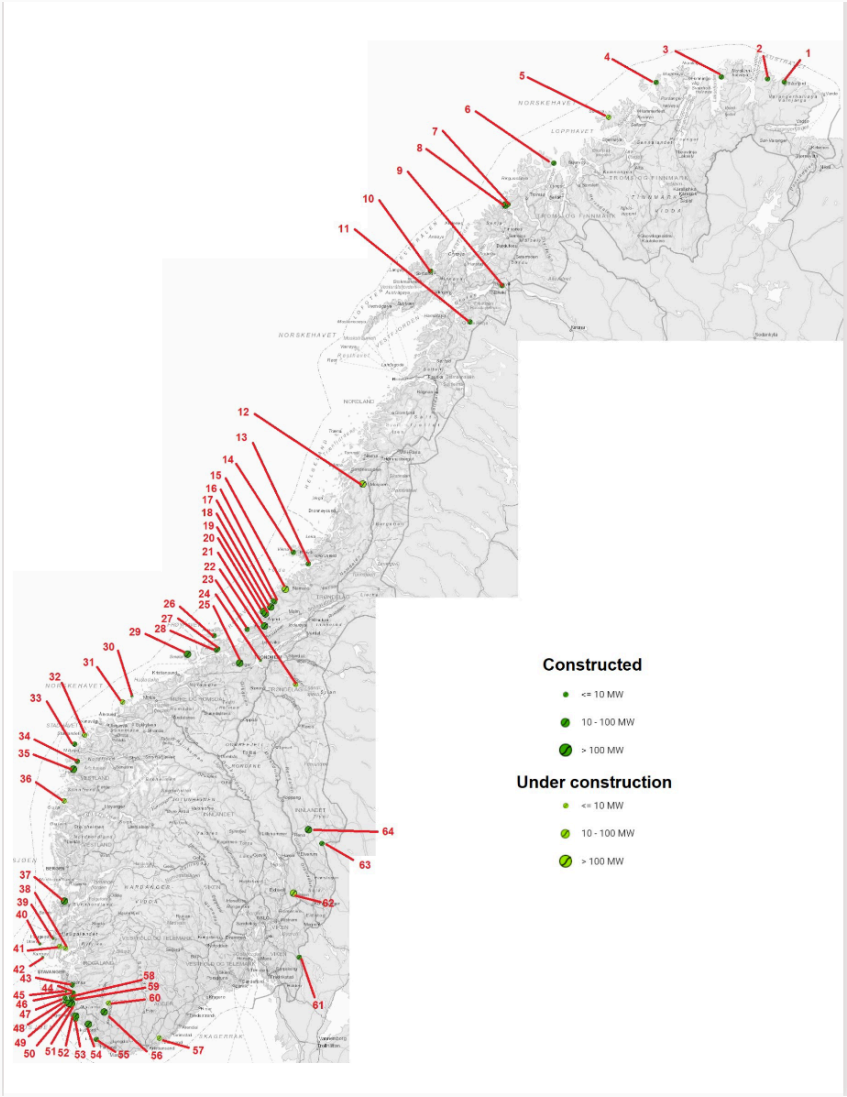
Results: Temporal distribution

- National framework for wind power presented April 1, 2019

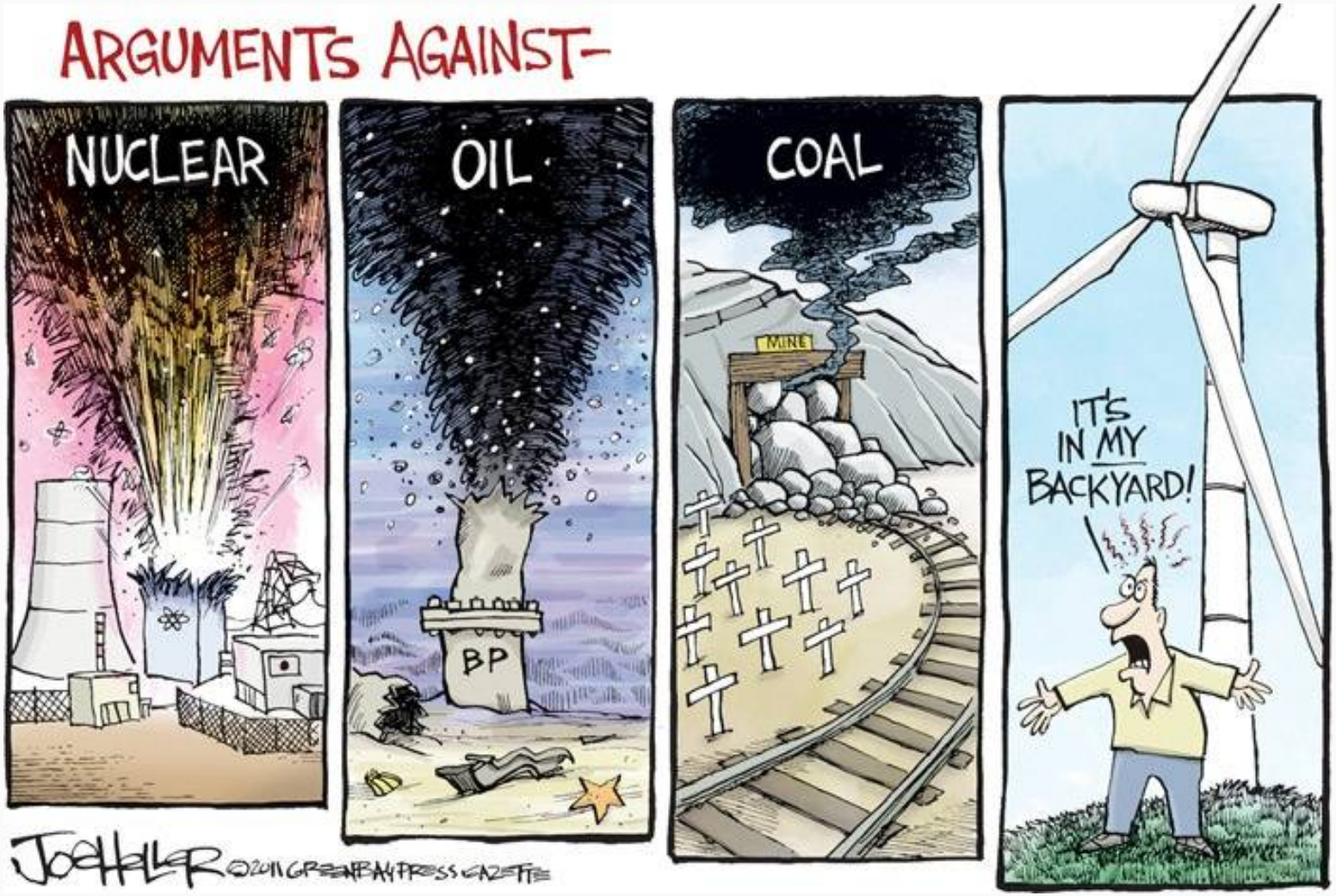


Results: Spatial distribution

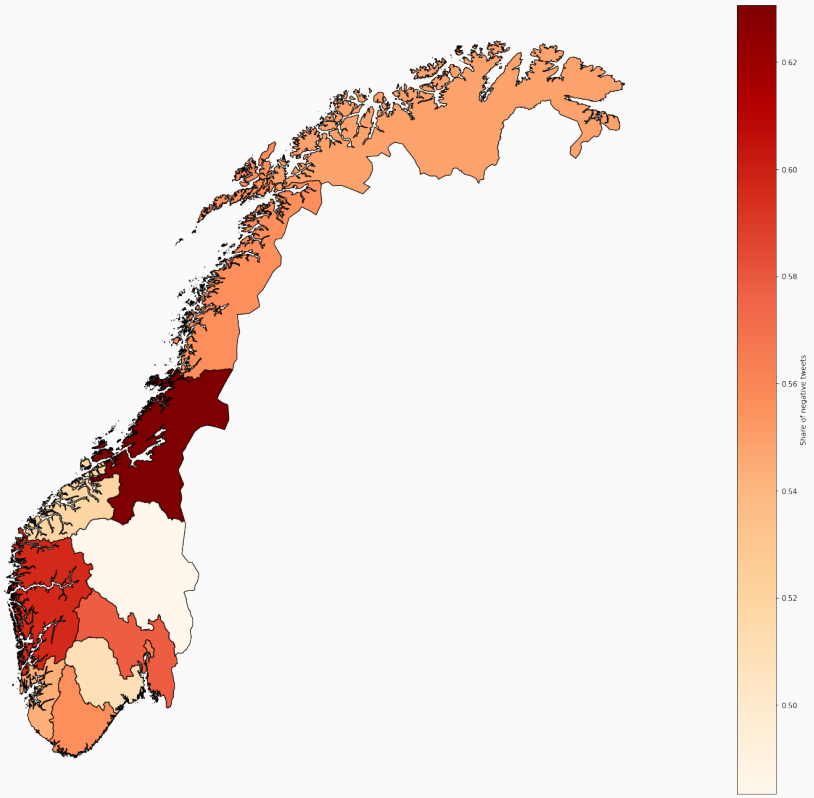


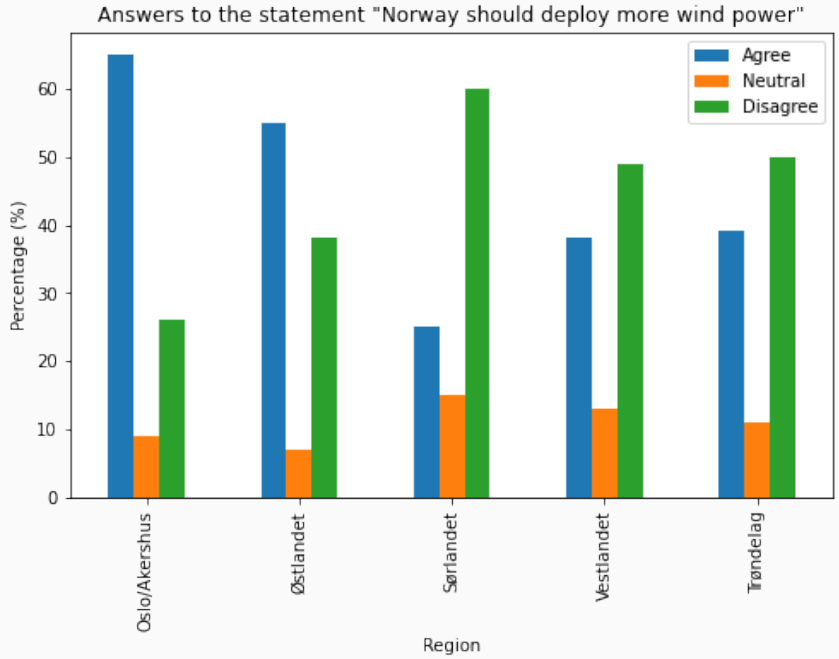


Results: Spatial distribution contd.



Results: Spatial distribution





Reconstruction of surveying from University of Bergen and Norsk medborgerpanel (University of Bergen, 2019)

The process made us realize

- The Twitter data we collected isn't necessarily a good representation of the population as a whole, we should consider other social media and platforms as well.
- We should include *neutral* as a label in the annotation process to avoid confusion.
- We should do a separate reconstructions of public sentiment towards off- and onshore wind energy.
- We had some trouble with retweet-objects and are tracing ourselves backwards to find the error.

Thank you very much for your attention!

References

CICERO. (2019). Folk og klima: Nordmenns holdninger til klimaendringer, klimapolitikk og eget ansvar. http://hdl.handle.net/11250/2634149

CICERO. (2020). Motbør for vindkraft på land. https://cicero.oslo.no/no/posts/klima/motbor-for-vindkraft-paa-land

IPSOS. (2021). Ipsos SoMe-tracker Q2'21 er endelig tilgjengeligIpsos SoMe-tracker Q2'21 er endelig tilgjengelig https://www.ipsos.com/nb-no/ipsos-some-tracker-q221-er-endelig-tilgjengelig

Kim, S. Y., Ganesan, K., Dickens, P., & Panda, S. (2021). Public Sentiment toward Solar Energy—Opinion Mining of Twitter Using a Transformer-Based Language Model. Sustainability, 13(5), 2673. https://doi.org/10.3390/su13052673

Norwegian Water Resources and Energy Directorate. (2019). Forslag til nasjonal ramme for vindkraft. http://publikasjoner.nve.no/rapport/2019/rapport2019_12.pdf

University of Bergen. (2019). Dette mener nordmenn om vindkraft på land og til havs. https://www.uib.no/matnat/132381/dette-mener-nordmenn-om-vindkraft-p%C3%A5-land-og-til-havs