Social media data

and its potential for official statistics

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Why social media?

Map by Eric Fischer (via Fast Company)

Social media research at Stat. Neth.

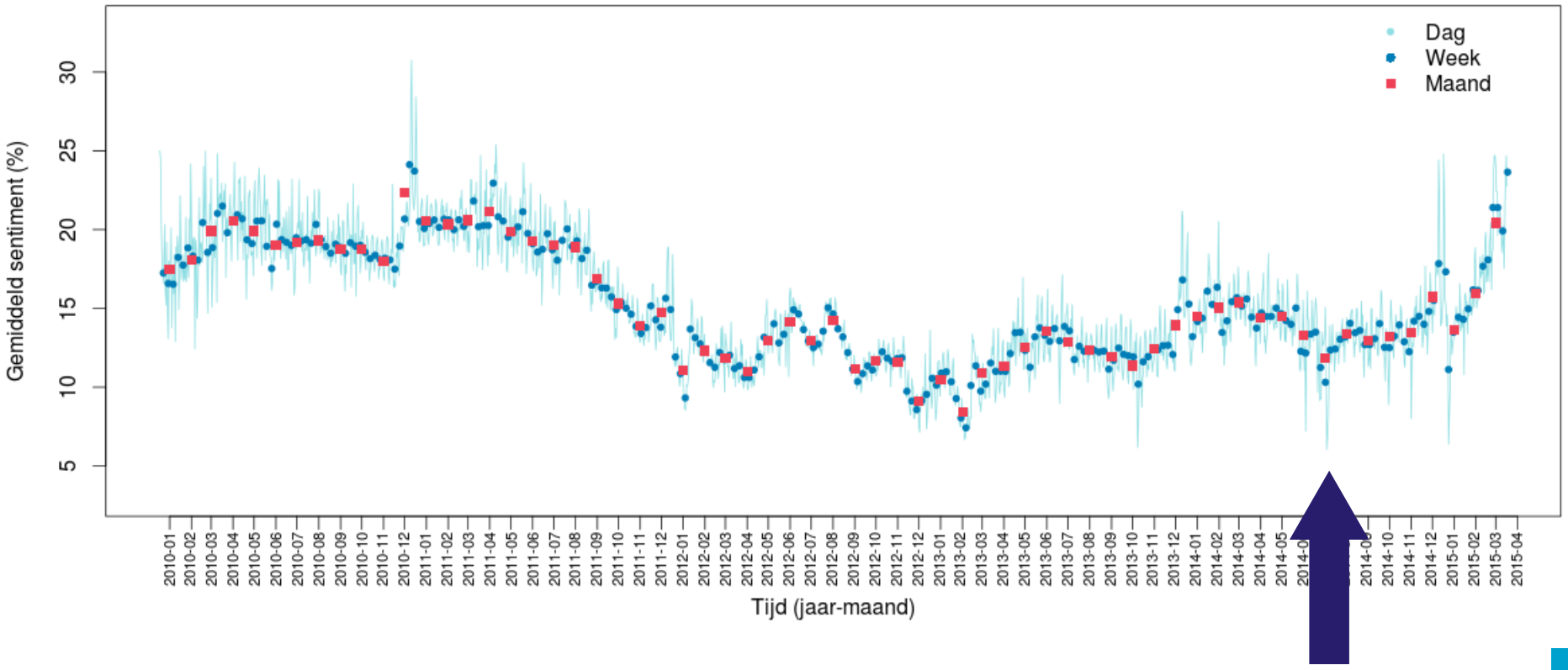
1. Compare Twitter *topics* and theme's CBS publications
2. **Social media *sentiment* and consumer confidence**
3. **'Measure' *other* basic *emotions* in social media**
4. Social *cohesion* and Twitter (for a municipality)
5. **Selectivity: background characteristics of Twitter users**
6. Event detection on Dutch highways
7. More on the way …

2) Sentiment indicator

- Determine sentiment in *public* Dutch social media messages
  - Huge amounts of Facebook and Twitter messages
  - (#pos - # neg)/#total (day/week/month)
- High correlation (> 0.8) with consumer confidence index
- Both series cointegrate (-> strong association)

- How's the situation now?
  - For > 5 years of data (Jan. 2009- March 2015)

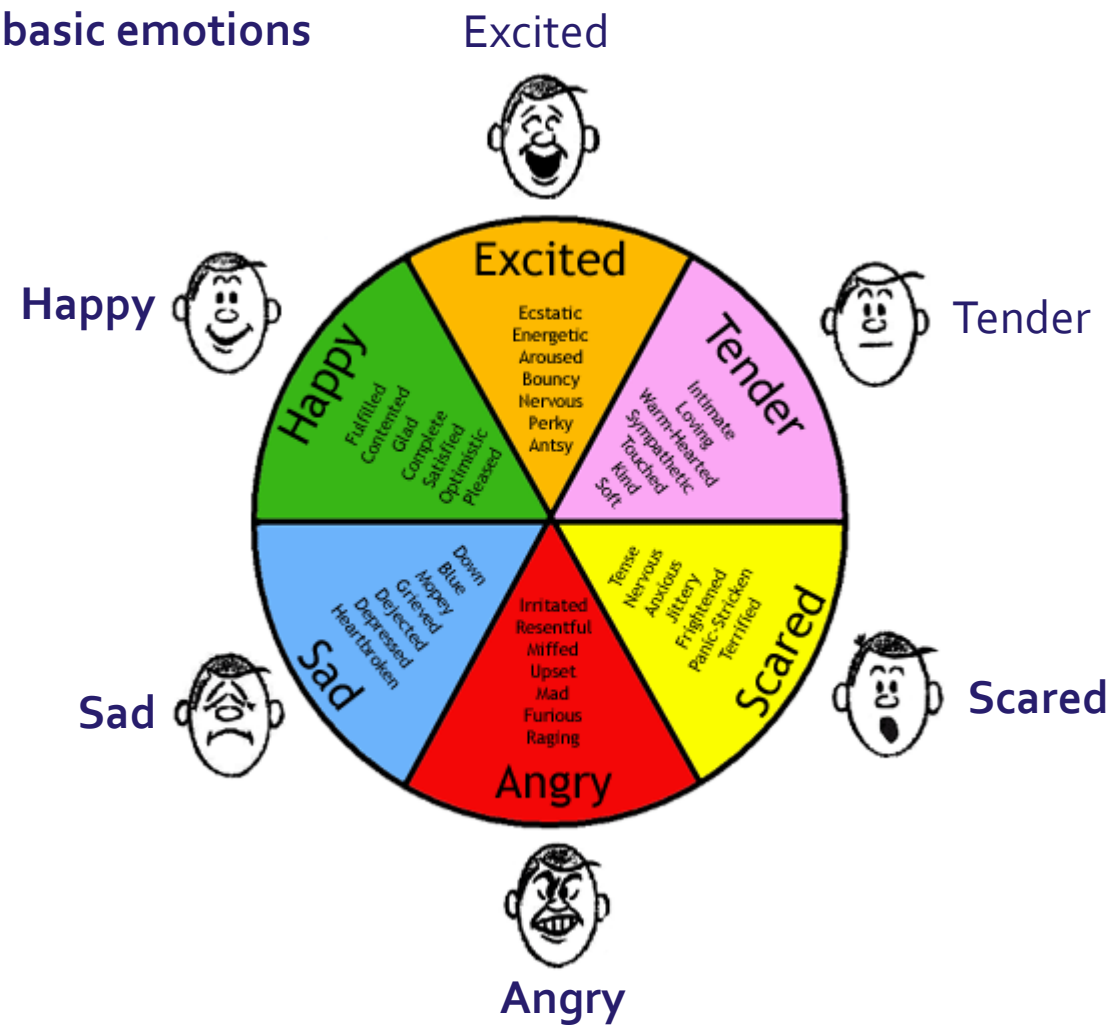
‘Sentiment’ indicator for NL (beta-version)



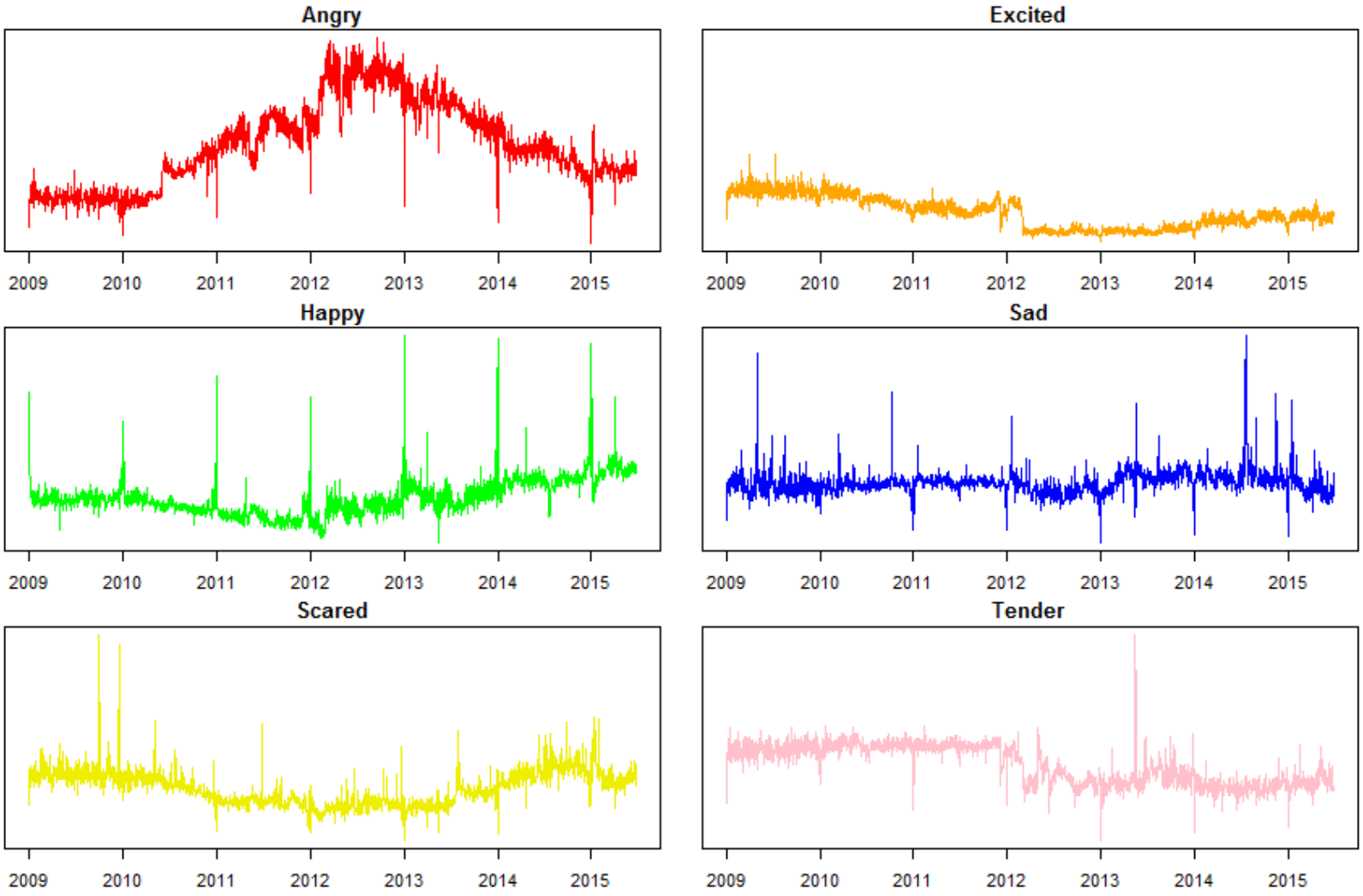
Based on the average sentiment of *public* Dutch Facebook and Twitter messages

3) Basic emotions in Social Media

A number of basic emotions



First results



5) Selectivity: Twitter user characteristics

- Only a part of the Dutch are active on Twitter
- If we want to use this source we need more info
- By determining their 'background' characteristics
  - Such as *gender*, age, income, level of education etc.

- What are the possibilities?
  - Feature extraction is the way to go
    - For **gender**

4) Picture

1)Name

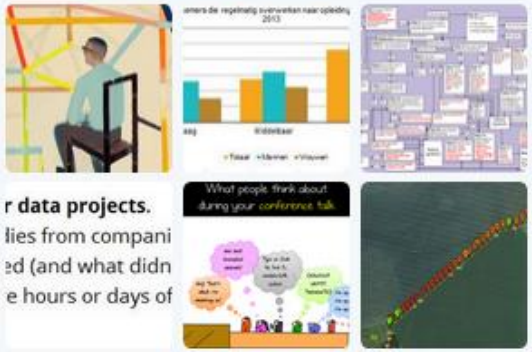
Piet Daas
@pietdaas

Researcher, Big Data scientist and father of 3.

2) Short bio

Eindhoven
about.me/pietdaas
Joined February 2010

40 Photos and videos



TWEETS 1,665 | FOLLOWING 74 | FOLLOWERS 175 | FAVORITES 81 | LISTS 1

3) Messages content

Tweets | Tweets & replies | Photos & videos

Piet Daas retweeted

Big Data Network @BigDataNetwork · 16h

#BigData News » Apache Spark jumps on the R bandwagon: Apache Spark, the big data processi... bit.ly/1w2IqJo via @BigDataNetwork

5 2

Piet Daas retweeted

Dr. Diego Kuonen @DiegoKuonen · Feb 21

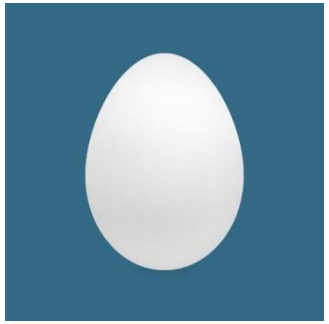
Is redoing scientific research the best way to find truth?
sciencenews.org/article/redoin...
#Science #BigData #Reproducibility

Studied a Twitter sample

- From a list of Dutch Twitter users (~330.000)
- A random sample of 1000 unique ids was drawn

- Of the sample:
  - 844 profiles still existed
    - 844 had a name
    - 583 provided a short bio
    - 473 created 'tweets'
    - 804 had a 'non-default' picture

    - 409 Men (49%)
    - 282 Women (33%)
    - 153 'Others' (18%)
      - companies, organizations, dogs, cats, 'bots'..



Default Twitter picture

Gender findings: 1) First name

Nederlandse Voornamenbank

Voornaam is gelijk aan Piet Zoek!

populariteitslijsten

Piet ook Piët

popularitеit | verspreiding | verklaring

m	NL totaal (2010)	%		
als eerste naam:	4235	0.0564%	[popularitеit]	[% popularitеit]
als volgnaam:	2415	0.0333%	[popularitеit]	[% popularitеit]
v				
als eerste naam:	<5	<0.0001%	[popularitеit]	[% popularitеit]
als volgnaam:	54	0.0007%	[popularitеit]	[% popularitеit]

Popularitеit van 'Piet' als eerste naam voor mannen tussen 1880 en 2013

- Used Dutch 'Voornamenbank' website (First name database)
- Score between 0 and 1 (female – male); 676 of 844 (80%) names were registered
- Unknown names scored -1 (usually companies/organizations)

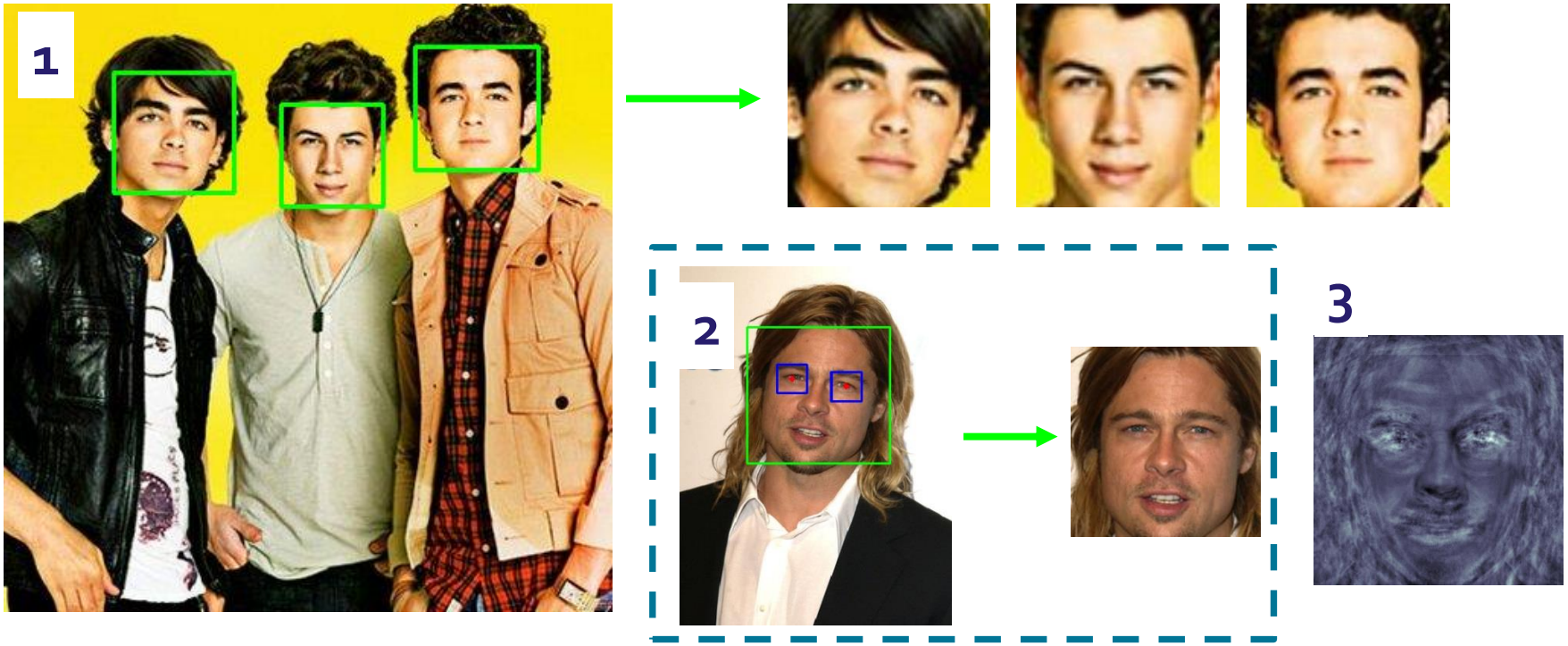
Gender findings: 2) Short bio

- If a short bio is provided
  - Quite a number of people mention there 'position' in the family
    - Mother, father, papa, mama, 'son of', etc.
  - Sometimes also occupations are mentioned that reflect the gender ('studente')
  - 155 of 583 (27%) indicated there gender in short bio
  - Need to check both English and Dutch texts

Gender findings: 3) Tweets content

- In cooperation with University of Twente (Dong Nguyen)
- Machine learning approach that determines gender specific writing style
- Language specific: Messages need to be Dutch!
  - 437 of 473 (92%) persons that created tweets could be classified

Gender findings: 4) Profile picture



– Use OpenCV to process pictures
  1) Face recognition
  2) Standardisation of faces (resize & rotate)
  3) Classify faces according to gender
    - 603 of 804 (75%) profile pictures had 1 *or more* faces on it

Gender findings: overall results

	Diagnostic Odds Ratio (log)
First name	4.33
Short bio	2.70
Tweet content	1.96
Picture (faces)	0.57

Diagnostic Odds Ratio =

(TP/FN) / (FP/TN)

random guessing

log(DOR) = 0

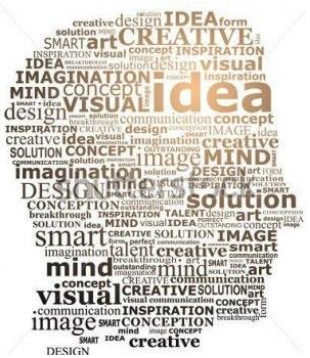
- Multi-agent findings
  - Need ‘clever’ ways to combine these
  - Take processing efficiency of the ‘agent’ into consideration

Concluding remarks

- Social media is a difficult source to study
  - Contains a lot of 'noise'
- Social media is a secondary data source
  - Produced for a 'reason' not identical to the one we want to use it for
    - A paradigm shift is needed (need a different mindset)
    - Try to improve quality (reduce noise; apply filter)
    - Make use of the large volume of data available
- Analysing texts and pictures is different/difficult
  - Learn by doing and by cooperating with experts
- Social media produces interesting results but
  - It is a relatively new area for official statistics, so a lot needs to be checked (this takes time)
- There are certainly possibilities for official statistics but
  - Is everybody in the office ready?

The Future

The future of statistics looks



BIG

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Thank you for your attention!