CARMA 2018

Technical Sentiment Analysis

Measuring Advantages and Drawbacks of New Products Using Social Media
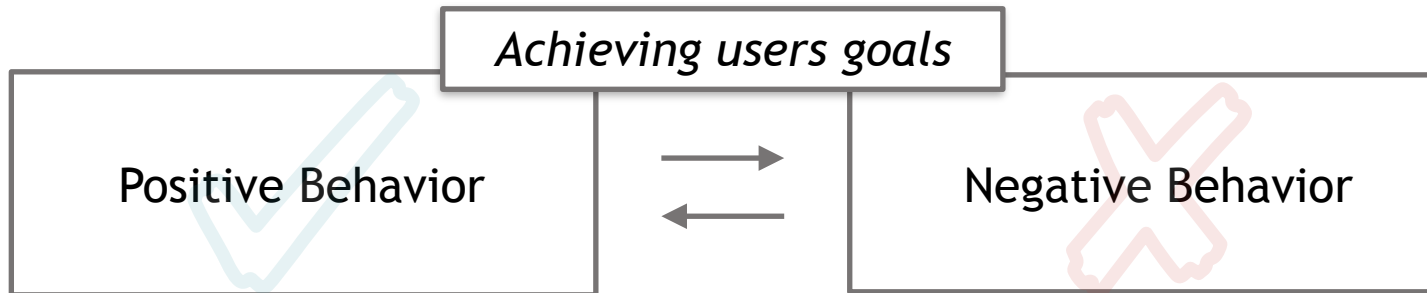
Filippo Chiarello, Andrea Bonaccorsi, Gualtiero Fantoni, Giacomo Ossola, Andrea Cimino and Felice Dell'Orletta

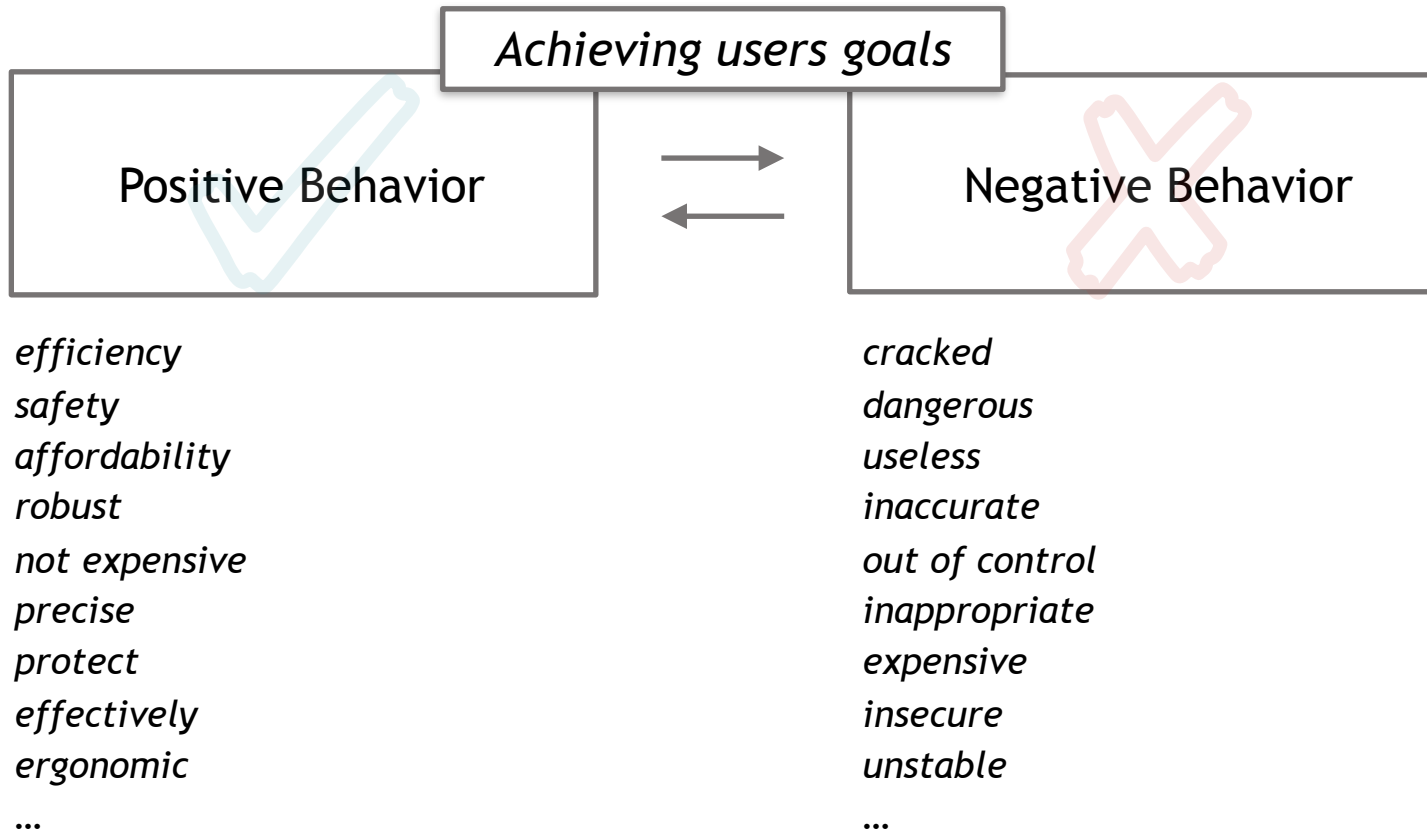*University of Pisa*: *Engineering School and Italian Natural Language Processing Group*

Advantages and Drawbacks of Inventions

Achieving users goals

Chiarello, Filippo, Gualtiero Fantoni, and Andrea Bonaccorsi. "Product description in terms of advantages and drawbacks: Exploiting patent information in novel ways.", ICED 2017

Advantages and Drawbacks of Inventions

Achieving users goals

Positive Behavior → ← Negative Behavior

Advantages and Drawbacks of Inventions

Achieving users goals

Positive Behavior	Negative Behavior

efficiency — cracked

safety — dangerous

affordability — useless

robust — inaccurate

not expensive — out of control

precise — inappropriate

protect — expensive

effectively — insecure

ergonomic — unstable

... — ...

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Advantages and Drawbacks of Inventions

Achieving users goals

Positive Behavior		Negative Behavior

efficiency		cracked
safety		dangerous
affordability		useless
robust		inaccurate
not expensive	**10,175**	out of control	**16,053**
precise		inappropriate
protect		expensive
effectively		insecure
ergonomic		unstable
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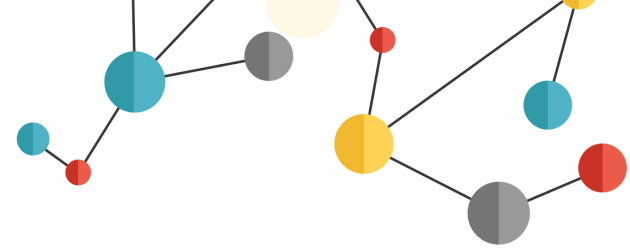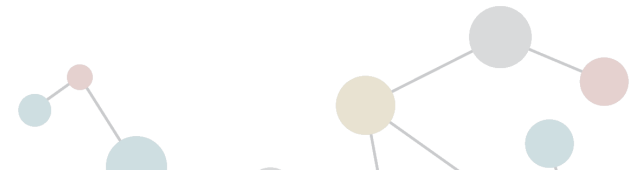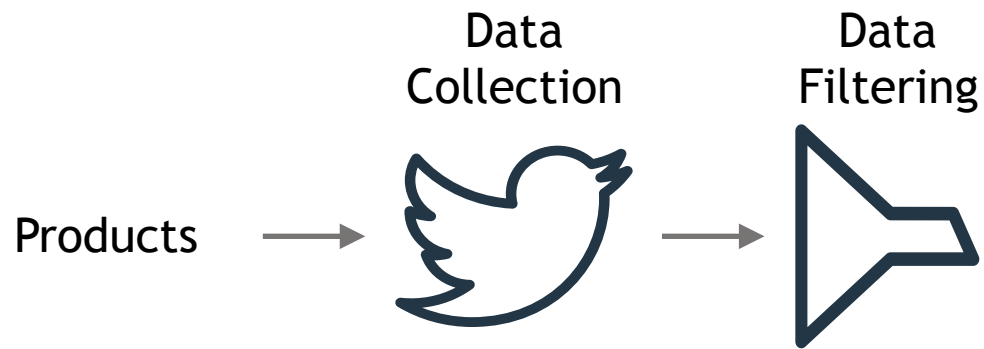
METHODOLOGY

Methodology

Products

Methodology

Data
Collection

Products ———→

Methodology

Products → Data Collection → Data Filtering

Methodology

Products → Data Collection → Data Filtering → Sentiment Analysis

Technical Sentiment

Methodology

Sentiment
Analysis

Data
Collection

Data
Filtering

Products

Results
Comparison

Technical
Sentiment
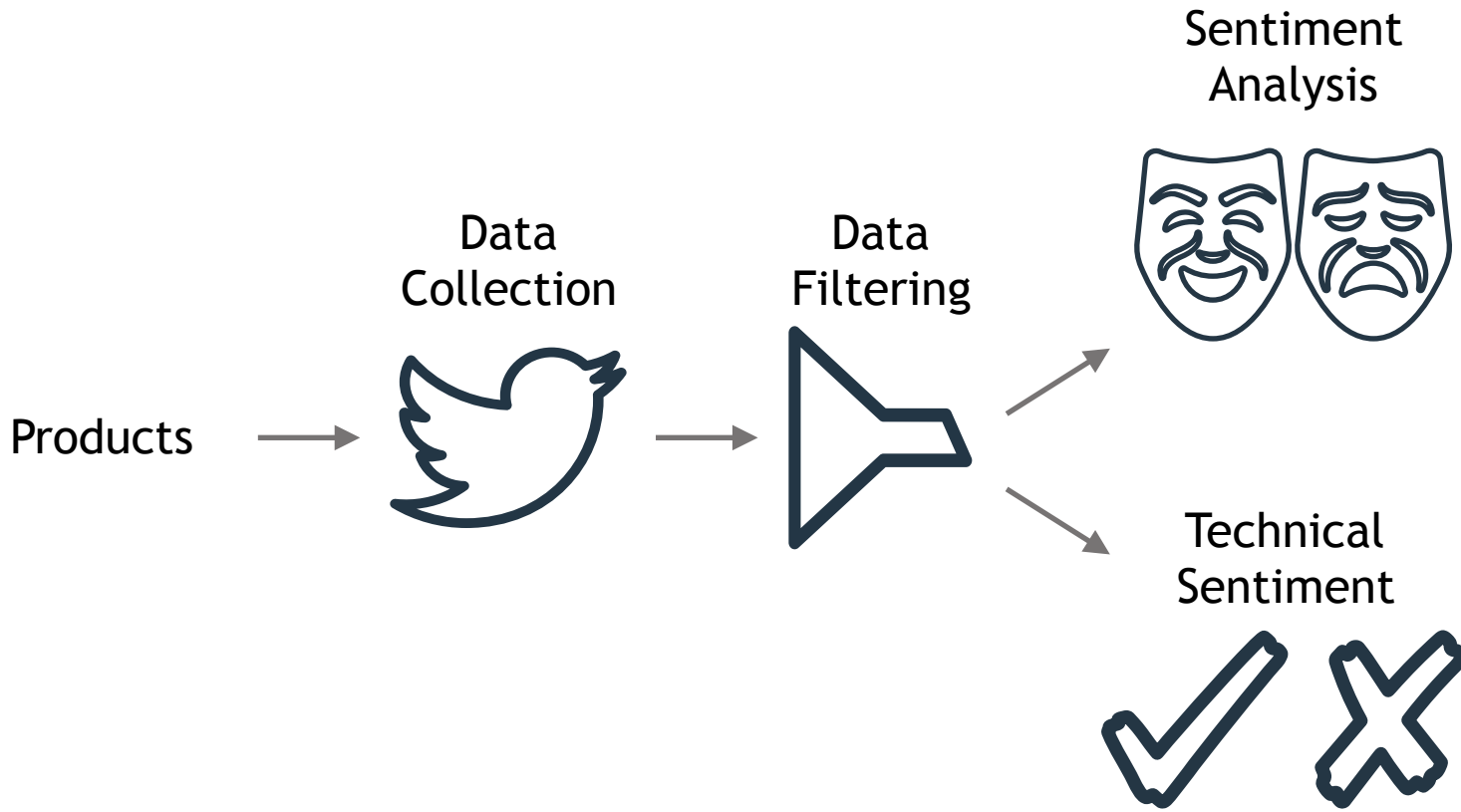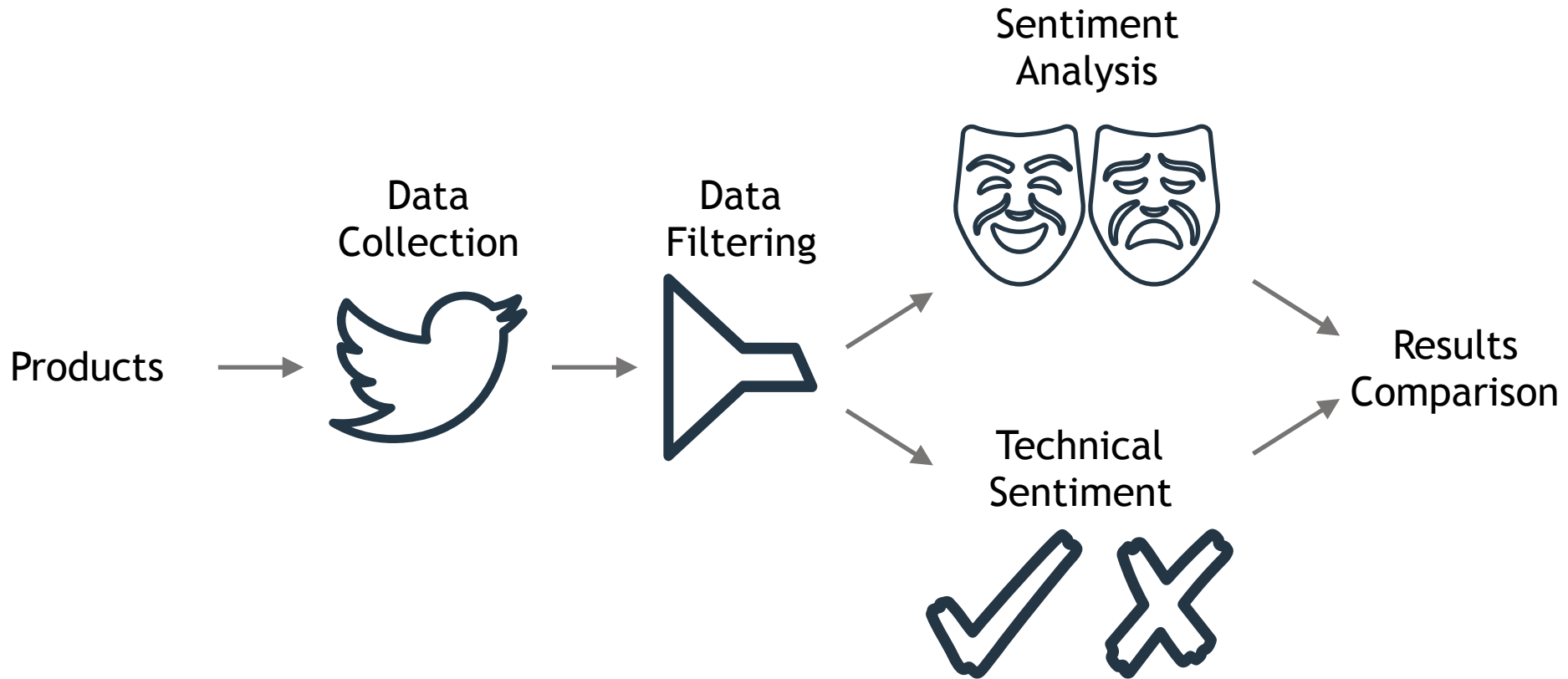
Products

Microsoft unveiled **<u>Xbox One X</u>**, a *high-end version of Xbox One* which has been released on 7th of November 2017.

First teased at E3 2016 under the codename "Project Scorpio", *Xbox One X features upgraded hardware that is designed primarily to play games at* **4K resolution**, and "super sampling" to provide graphical improvements on **high-definition displays**.

Products

The **New Nintendo 2DS XL** is a *handheld game console* and is the sixth system in the *Nintendo 3DS family* of handheld consoles.

It is a streamlined version of the New Nintendo 3DS XL, retaining most of the enhancements it carries over the original 2DS and 3DS models, including its **updated processor**, **additional controls**, and Amiibo support, but with no **autostereoscopic 3D display**, and a **thinner build**.

Triggering event

*We selected an event able to **polarise** Twitter users' attention.*

The **Electronic Entertainment Expo**, commonly referred to as E3, is a premier trade event for the video game industry.

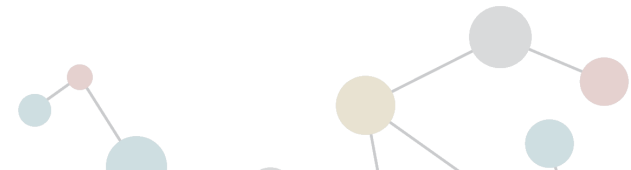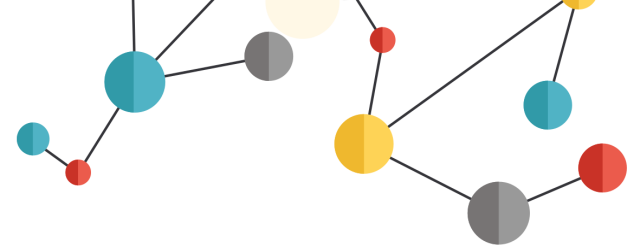In 2017, the event was held since **13th June to 15th June.**

Data Collection

Search vs Streaming API

- Tweeter Search API allows to retrieve all tweets that match a small set of keywords
- Streaming API allows to stream all tweets that Twitter makes accessible through the API itself (roughly 1% of all tweets)

We decided to go with **Streaming API** because it is free

Data Collection

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Search query

We built a search query composed from both:

- **Hashtags**
- **Keywords**

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Observation time

We collected tweets before, during, and after the tradeshow:

- From **11th June** 2017 to **31st July** 2017

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Data size

- We collected more than **28 million** tweets
- We evaluated both timespan and data size to decide when to stop data collection process

Data Collection

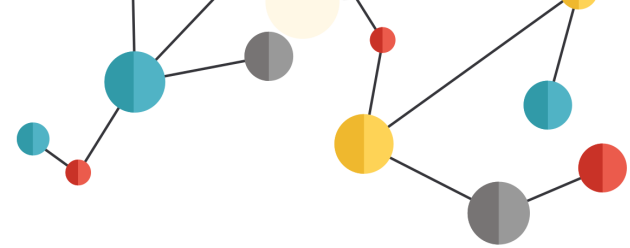| Xbox One X	New Nintendo 2DS XL
#Xbox	#Nintendo
#XboxE3	#2DS
#Scorpio	#2DSXL
#ProjectScorpio	#NewNintendo2DS
#XboxScorpio	#NewNintendo2DSXL
#xboxnext	
#xboxone	
#XboxOneX	

Note: Microsoft's console were initially marketed as "Project Scorpio". The company disclosed the official name during the tradeshow

Data Filtering

Problem	Solution	N. of Output Tweets
Tweets written in different languages	**Language classifier** to identify english tweets	7.165.216
Advertising	**Supported Vector Machine classifier** to identify relevant tweets	66.796
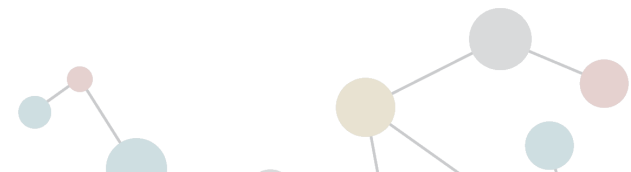
SVM classifier for irrelevant tweets

We defined characteristics that make a tweet:

- **relevant**: posted by users or containing words or opinions related to our products of interests and their functionalities

- **irrelevant** tweets containing advertisings, links to e-commerce websites or messages related to other products or subjects

A researcher manually classified a subset made up of randomly extracted tweets, composed of 6.500 finding 105 relevant tweets and 6.395 irrelevant tweets.

SVM classifier for irrelevant tweets

| Text	Y/N
Does Xbox really think we don't know the One X is a One with a stronger processor and 499 is a decent price for a modest hardware upgrade?	Y
@NintendoAmerica Please explain how my 2DS can play Mario Maker, but can't download Super Mario World. Why do I need to buy a 2DSXL?	Y
Trappin out the condo 30 shot extendo pop the cartridge in like we play Nintendo	N
Emotionally connecting with your friends enables you to stay i... More for Xbox https://t.co/7gZyxKHU02	N
...	...

SVM model was then trained using this dataset, and computed a probability for each tweet to be relevant or irrelevant.

A threshold of 0.7 has been chosen to label a tweet as relevant or irrelevant.
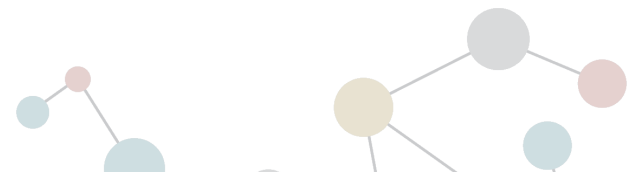
Sentiment Analysis & Technical Sentiment

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- We used a **deep learning** (RNN) classifier developed by Cimino (2016).

Cimino A., Dell'Orletta F. (2016) Tandem LSTM-SVM Approach for Sentiment Analysis. In Proceedings of EVALITA '16, Evaluation of NLP and Speech Tools for Italian, 7 December, Napoli, Italy.

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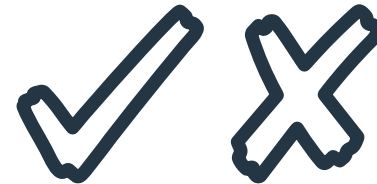# Sentiment Analysis & Technical Sentiment

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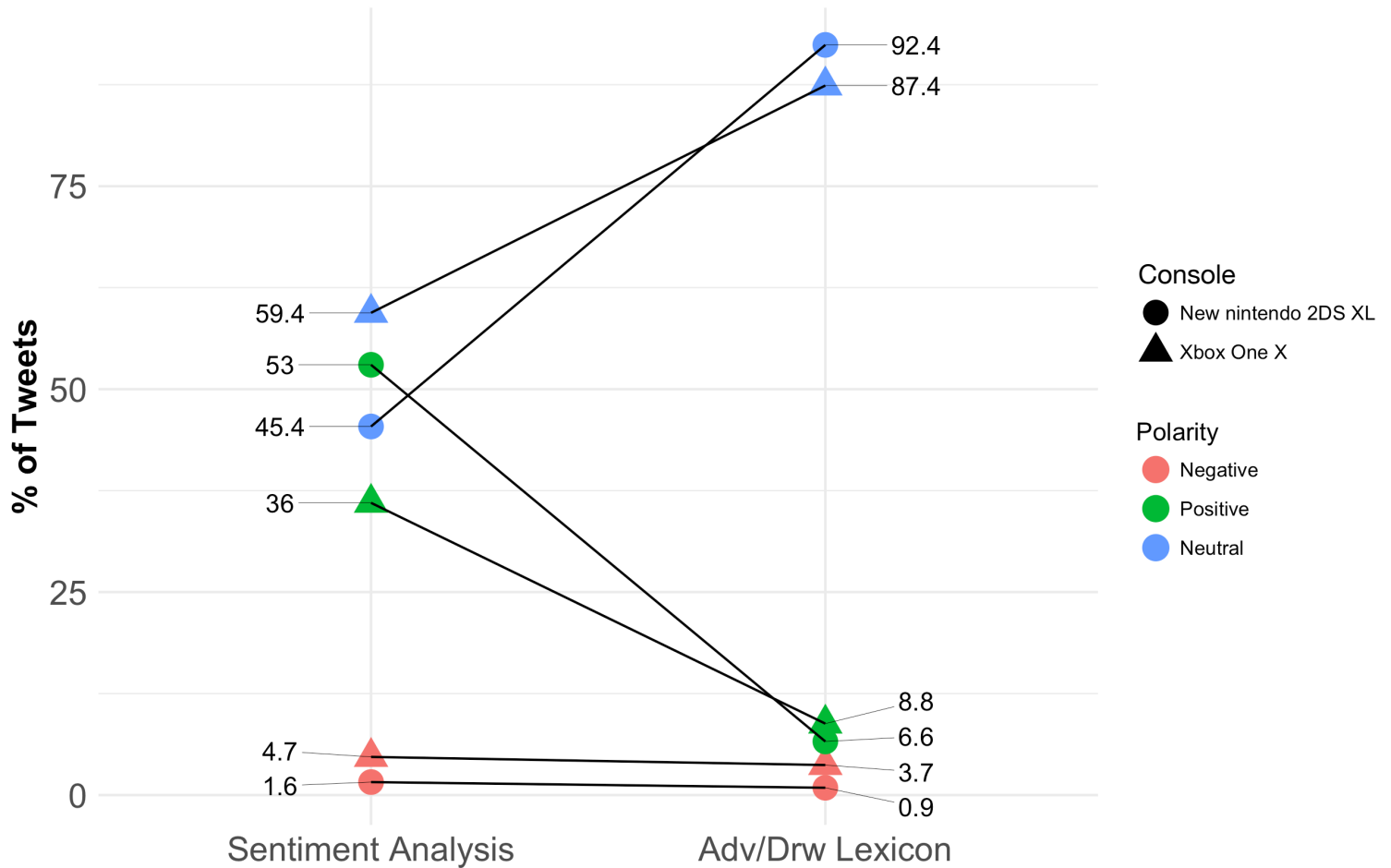
- We used the **lexicon** developed in Chiarello (2017)
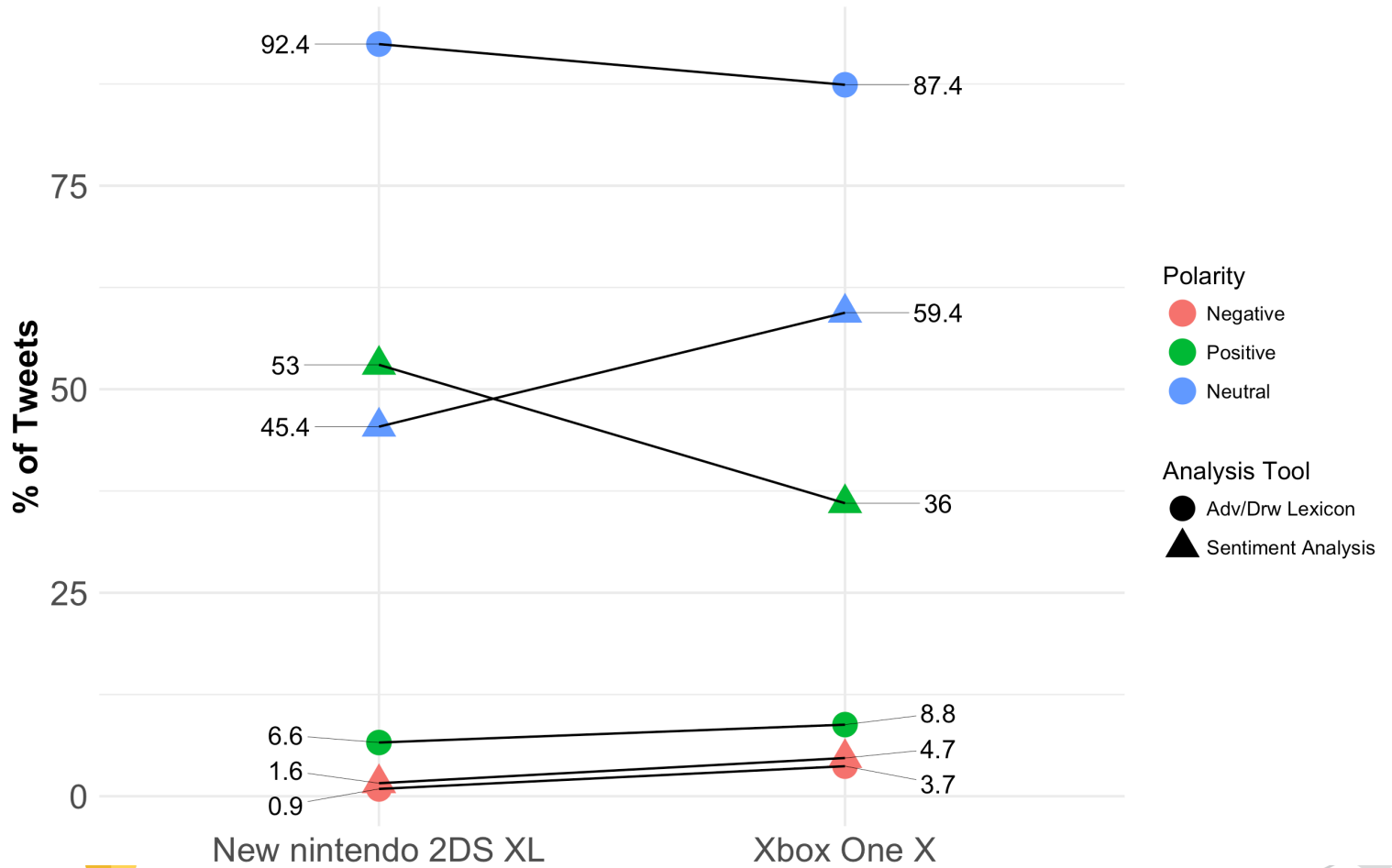
- Tweets are classified using a simple **word count**

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RESULTS

Hypothesis

The low signals in the outputs are related to:

- Different technology complexity of the products

- Different Marketing focus

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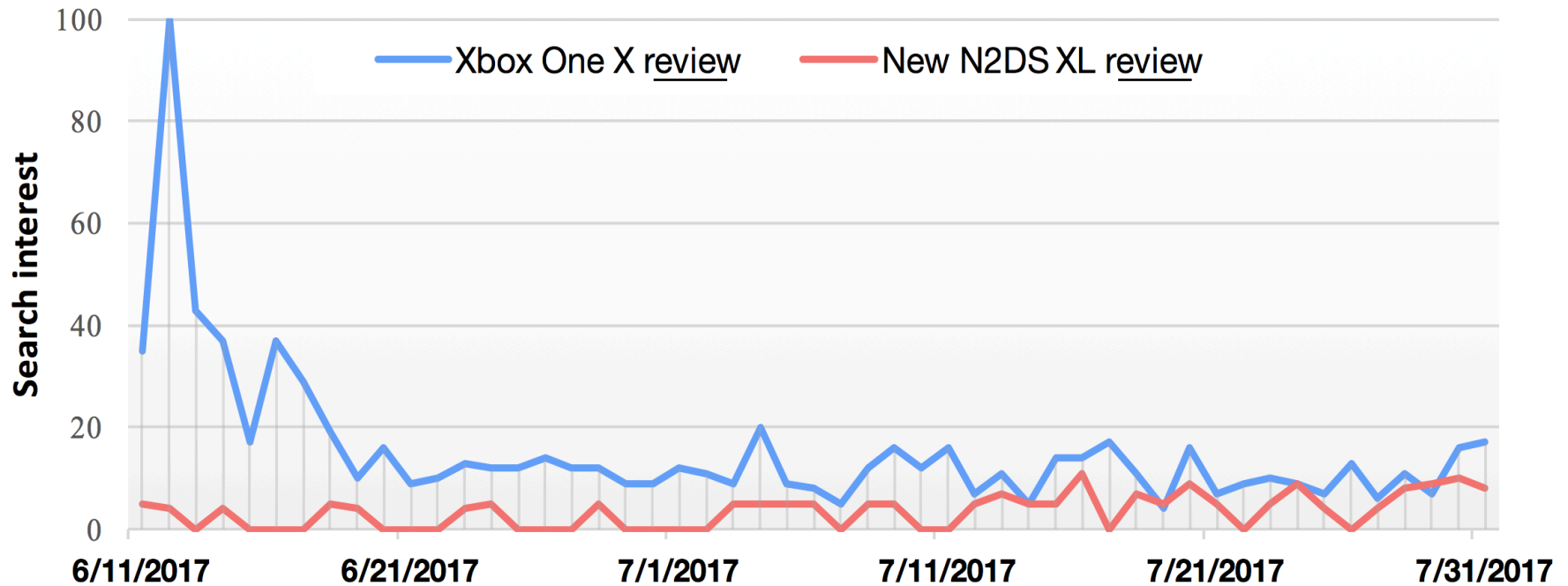
- Different technology complexity of the products

- Different Marketing focus

↓

We can use technical reviews as a proxy

Google Trends

Queries entered into Google trends engine to search for **technical reviews**:

Google Search

Queries entered into Google search engine to search for **technical reviews**:

	Search queries
Xbox One X	allintitle: (4k OR hdr OR hardware OR graphics OR review OR resolution OR fps OR fast OR comparison OR frame OR enhanced OR performance OR cpu OR gpu OR ram) AND ("xbox one x") site: ign.com
New Nintendo 2DS XL	allintitle: (graphics OR review OR screen OR comparison OR enhanced OR performance OR cpu OR gpu OR ram OR battery OR weight) AND "new nintendo 2ds xl" site: ign.com

We obtained **1.117** articles about **Xbox** and only **52** about **Nintendo**

Marketing Campaigns

Xbox ✔
@Xbox

Segui

Fully specced for 4K gaming. #XboxOneX
bit.ly/2t2zlGs

✔ 6 Teraflop GPU
✔ 12GB GDDR5 graphic memory
✔ 326GB/s memory bandwidth
✔ 8GB flash memory
✔ 1TB HDD internal storage

XBOX ONE X

10:35 - 14 giu 2017

816 Retweet   3.112 Mi piace

Nintendo of America ✔
@NintendoAmerica

Segui

Play the existing and upcoming library of 3DS
games in style with the New Nintendo
#2DSXL, available now! bit.ly/2veqANZ

11:00 - 28 lug 2017

212 Retweet   1.202 Mi piace

Conclusions

- Advantages and drawbacks analysis is more **effective** and **efficient** in giving technical-functional judgements about a product.

Conclusions

- Advantages and drawbacks analysis is more effective and efficient in giving technical-functional judgements about a product.

- It can gives **complementary** results with respect to sentiment analysis when a product has a certain technological complexity and fuels a **more technical social media discourse**

CARMA 2018

THANKS FOR YOUR ATTENTION!

Technical Sentiment Analysis: Measuring Advantages and Drawbacks of New Products Using Social Media

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UNIVERSITÀ DI PISA