

Extreme Events and Climate Change: How wild fires and other stress events affect the hype and social attention? A mass media article analysis.

ECOS 2022 35th International Conference on Efficiency, Cost, Optimization, Simulation and Environmental Impact

Panagiotis Varelas

Climate Change is happening now: In 2021 extreme events unfolded around the globe because of the extreme weather conditions

Climate Change is happening now: In 2021 extreme events unfolded around the globe because of the extreme weather conditions



Wildfires

California Wildfires:
8,619 fires
1,039,641 ha

Greece Wildfires
140+ fires
125,000 ha

Italy Wildfires
100+ fires
50,000 ha

Climate Change is happening now: In 2021 extreme events unfolded around the globe because of the extreme weather conditions

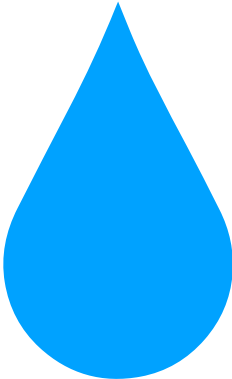


Wildfires

California Wildfires:
8,619 fires
1,039,641 ha

Greece Wildfires
140+ fires
125,000 ha

Italy Wildfires
100+ fires
50,000 ha



Floods

European Floods
12-25 July 2021

242 deaths,
huge economic
impact

Countries Affected:
Germany, Belgium,
Czech Republic, Austria

Climate Change is happening now: In 2021 extreme events unfolded around the globe because of the extreme weather conditions

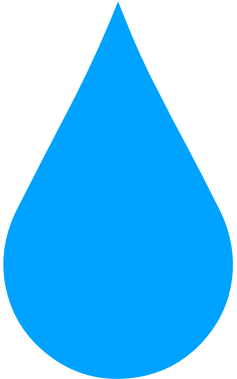


Wildfires

California Wildfires:
8,619 fires
1,039,641 ha

Greece Wildfires
140+ fires
125,000 ha

Italy Wildfires
100+ fires
50,000 ha

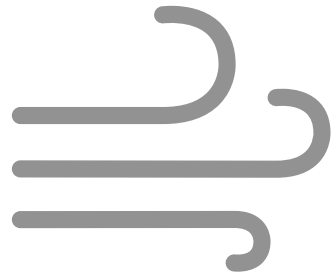


Floods

European Floods
12-25 July 2021

242 deaths,
huge economic
impact

Countries Affected:
Germany, Belgium,
Czech Republic, Austria



Hurricane IDA

August 26 -
September 4

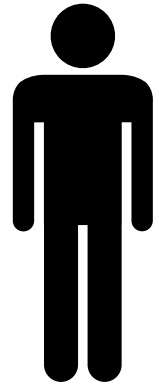
115 deaths

Countries Affected:
Venezuela, Cuba, USA,
Colombia, Jamaica

Extreme events engulf life on our planet in every possible way

Extreme events engulf life on our planet in every possible way

Fatalities



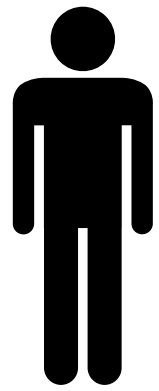
243 deaths in floods
(Europe July 2021)

102 deaths in wildfires
(Greece August 2018)

6 deaths in wildfires
(Italy July 2021)

Extreme events engulf life on our planet in every possible way

Fatalities

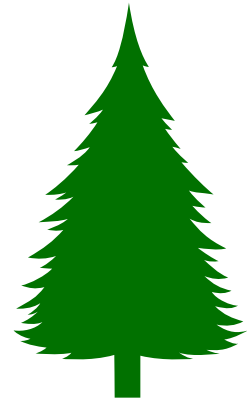


243 deaths in floods
(Europe July 2021)

102 deaths in wildfires
(Greece August 2018)

6 deaths in wildfires
(Italy July 2021)

Environmental

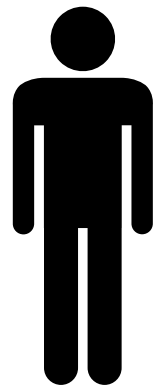


Thousands of square
kilometres burned

Large quantities of carbon
dioxide released in the
atmosphere

Extreme events engulf life on our planet in every possible way

Fatalities

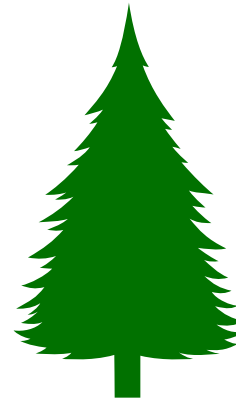


243 deaths in floods
(Europe July 2021)

102 deaths in wildfires
(Greece August 2018)

6 deaths in wildfires
(Italy July 2021)

Environmental



Thousands of square
kilometres burned

Large quantities of carbon
dioxide released in the
atmosphere

Economic



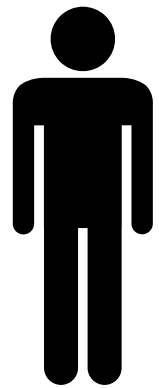
Reduction in purchasing power
and loss of land value

Loss of earnings and services

Loss of growing and pre-
harvest crops

Extreme events engulf life on our planet in every possible way

Fatalities

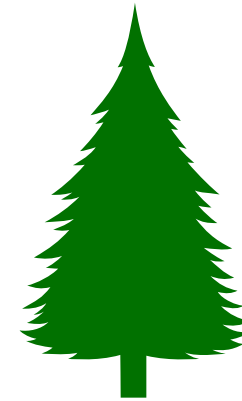


243 deaths in floods
(Europe July 2021)

102 deaths in wildfires
(Greece August 2018)

6 deaths in wildfires
(Italy July 2021)

Environmental



Thousands of square
kilometres burned

Large quantities of carbon
dioxide released in the
atmosphere

Economic



Reduction in purchasing power
and loss of land value

Loss of earnings and services

Loss of growing and pre-
harvest crops

Social



How do politicians react to
these disasters?

How do media and social
media respond?

Is there any increase hype in a
time window following such
disasters?

Natural Language Processing is a promising machine learning technique to process and analyse documents

Natural Language Processing is a promising machine learning technique to process and analyse documents

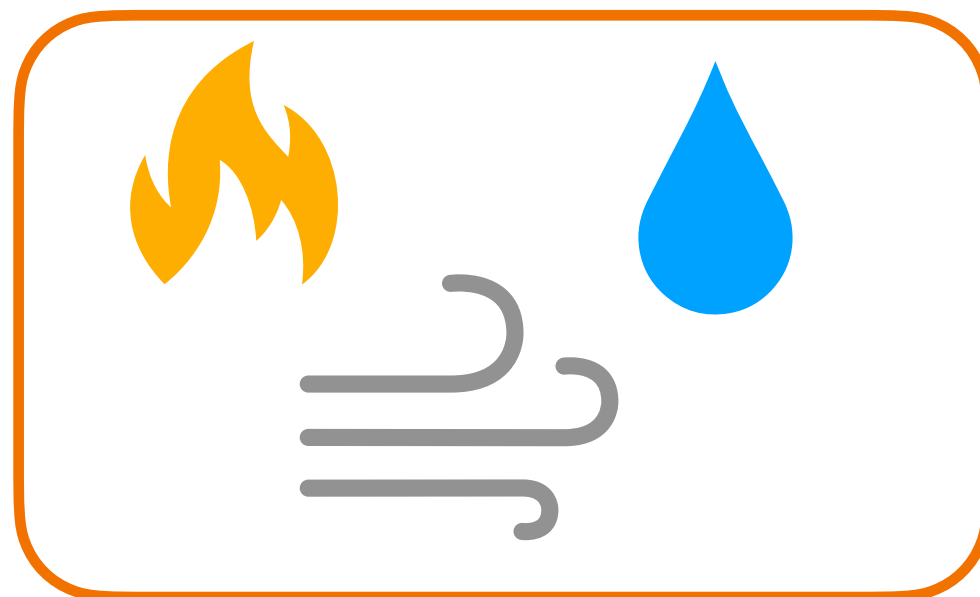


Extreme
Event

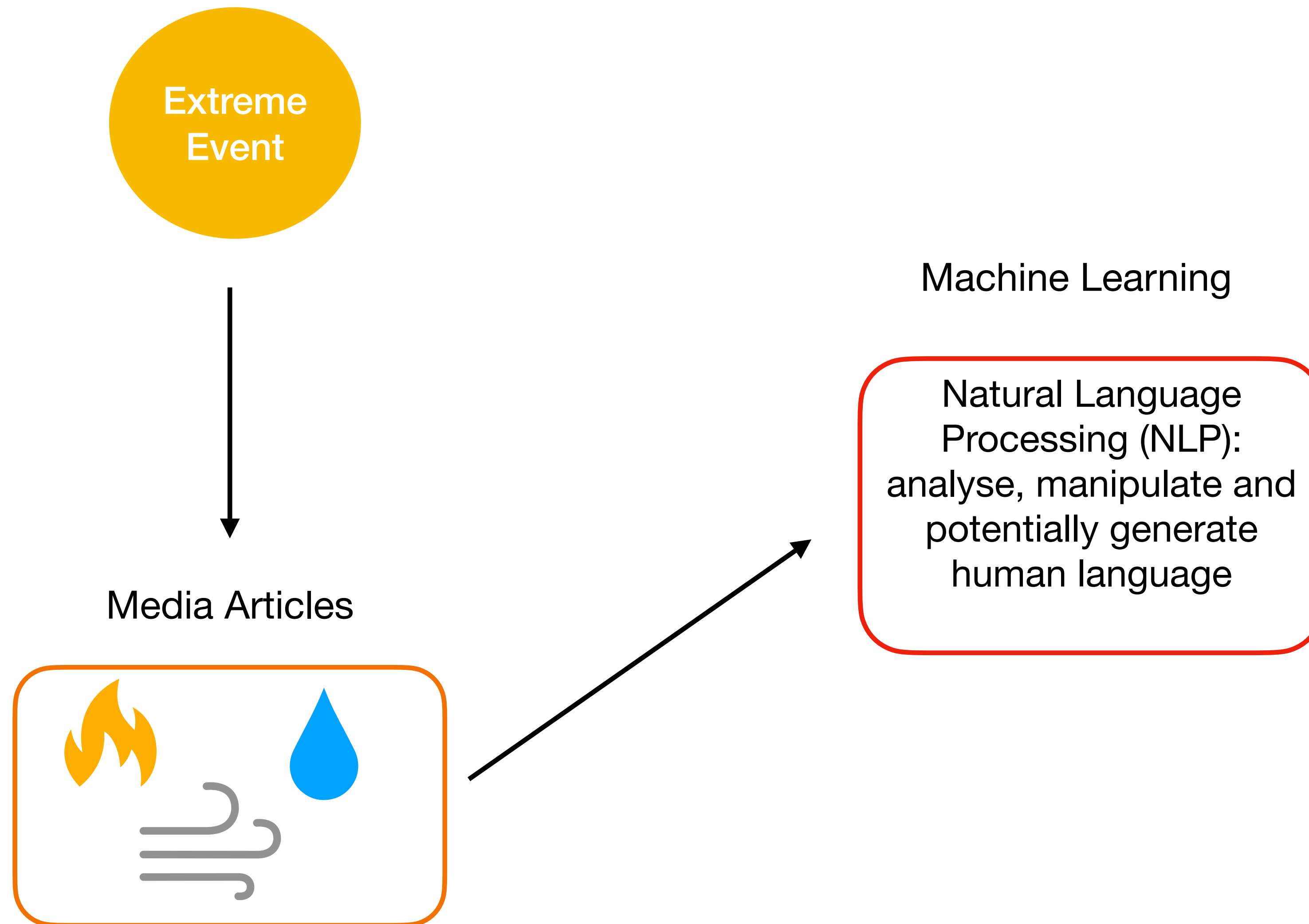
Natural Language Processing is a promising machine learning technique to process and analyse documents



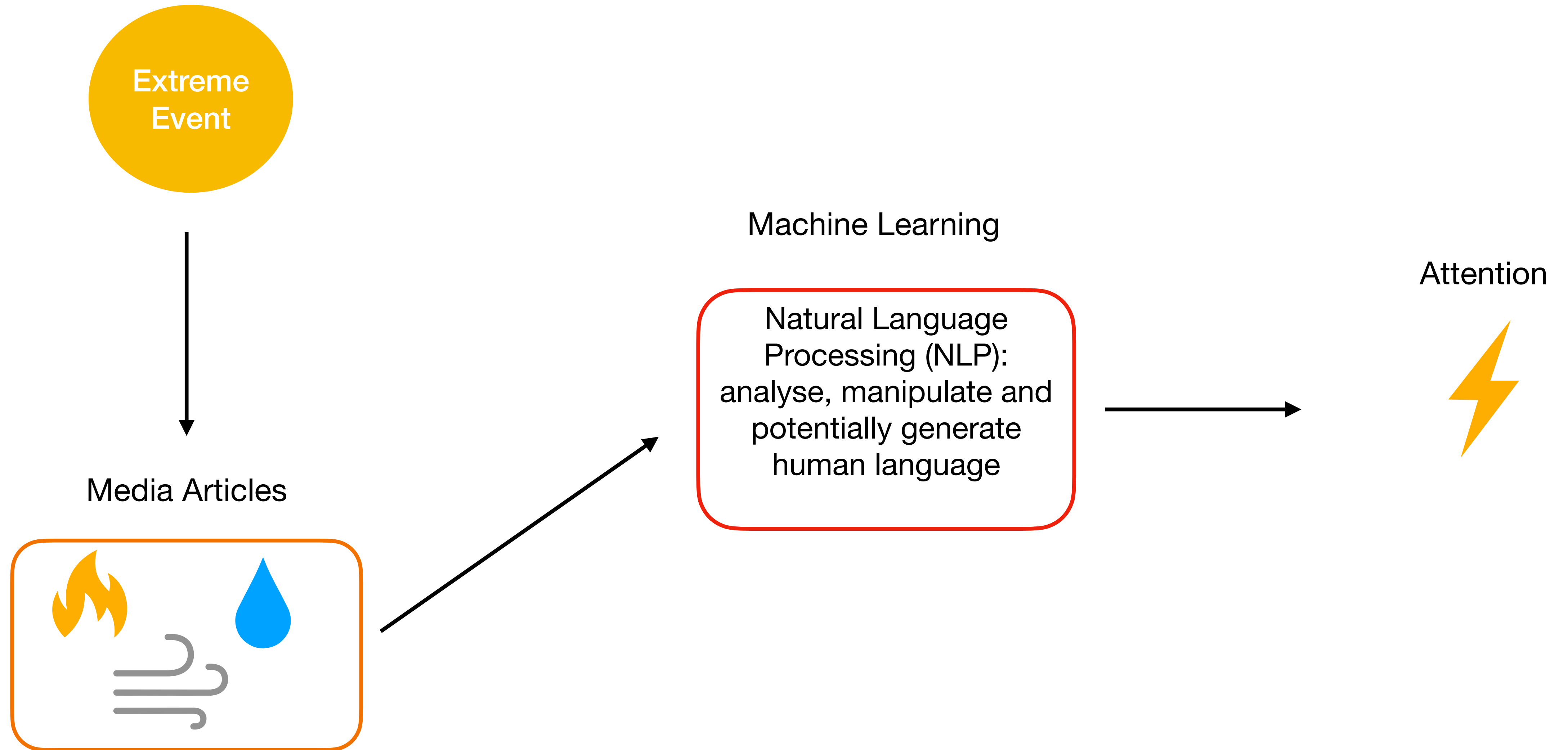
Media Articles



Natural Language Processing is a promising machine learning technique to process and analyse documents



Natural Language Processing is a promising machine learning technique to process and analyse documents



Data collection requires NLP in combination with Webscrapping

Data collection requires NLP in combination with Webscrapping

Popular Media

**The
Guardian**



EURACTIV



**Deutsche
Welle**

Data collection requires NLP in combination with Webscrapping

Methods

Popular Media

The Guardian



EURACTIV

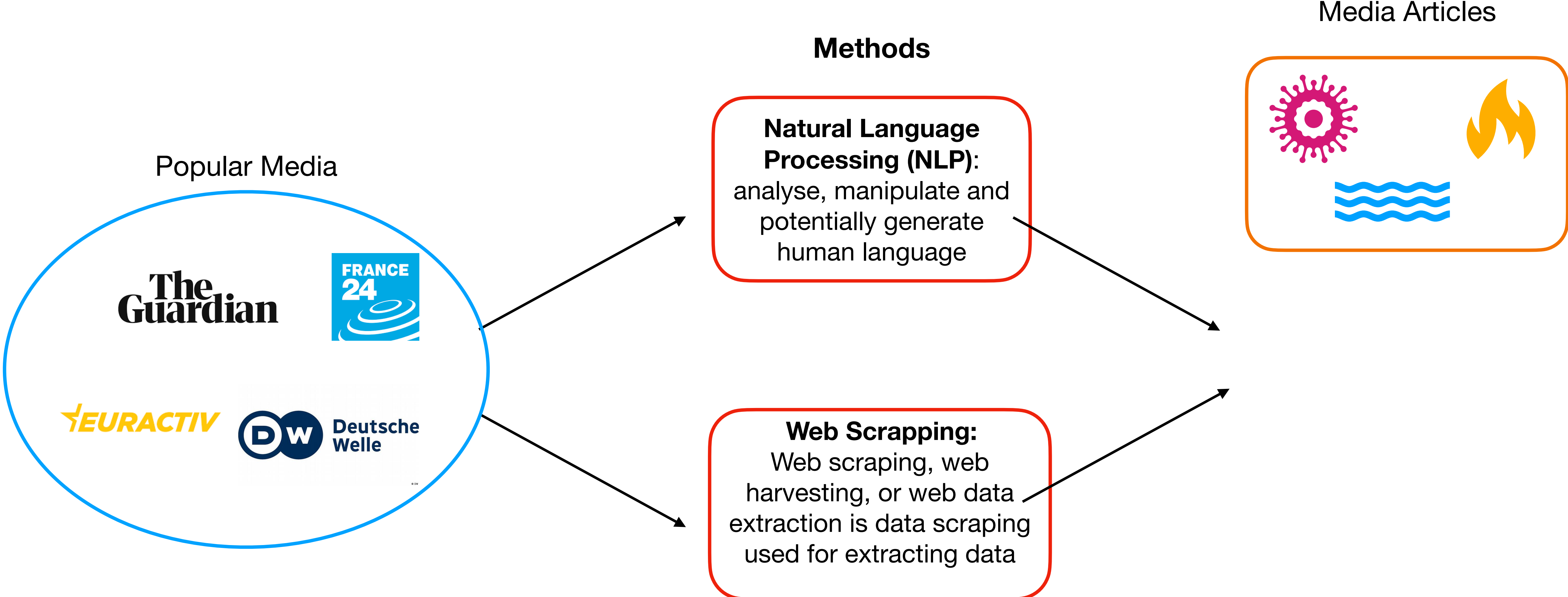


Deutsche Welle

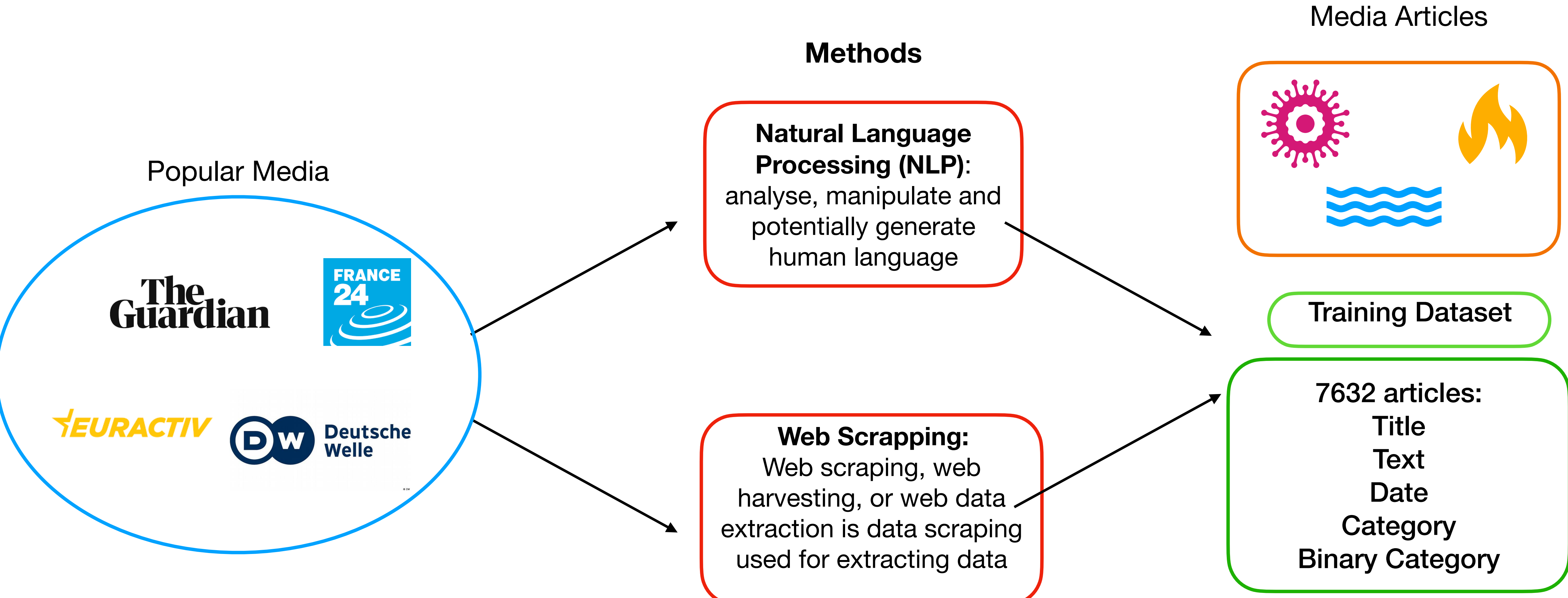
Natural Language Processing (NLP):
analyse, manipulate and potentially generate human language

Web Scrapping:
Web scraping, web harvesting, or web data extraction is data scraping used for extracting data

Data collection requires NLP in combination with Webscrapping

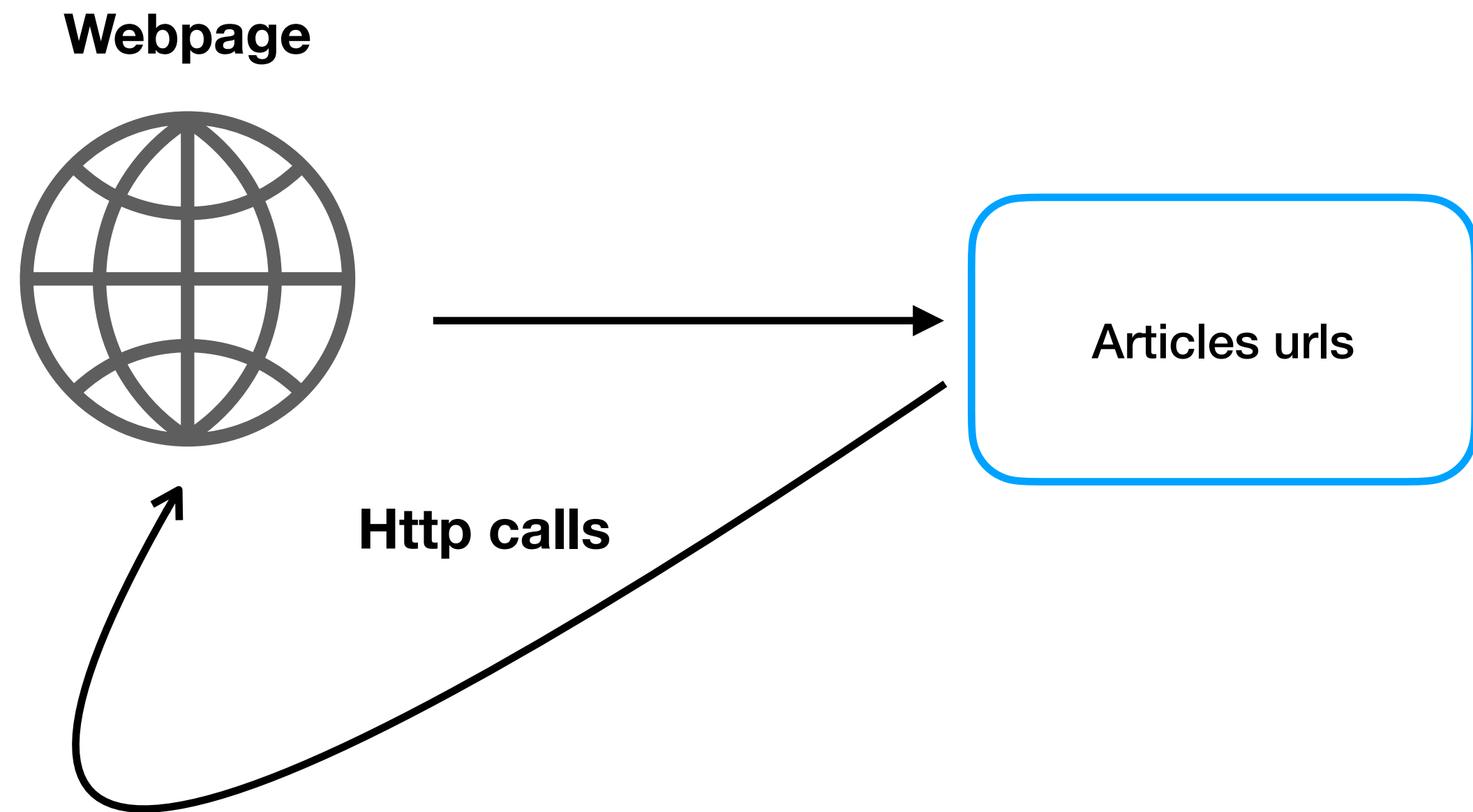


Data collection requires NLP in combination with Webscrapping

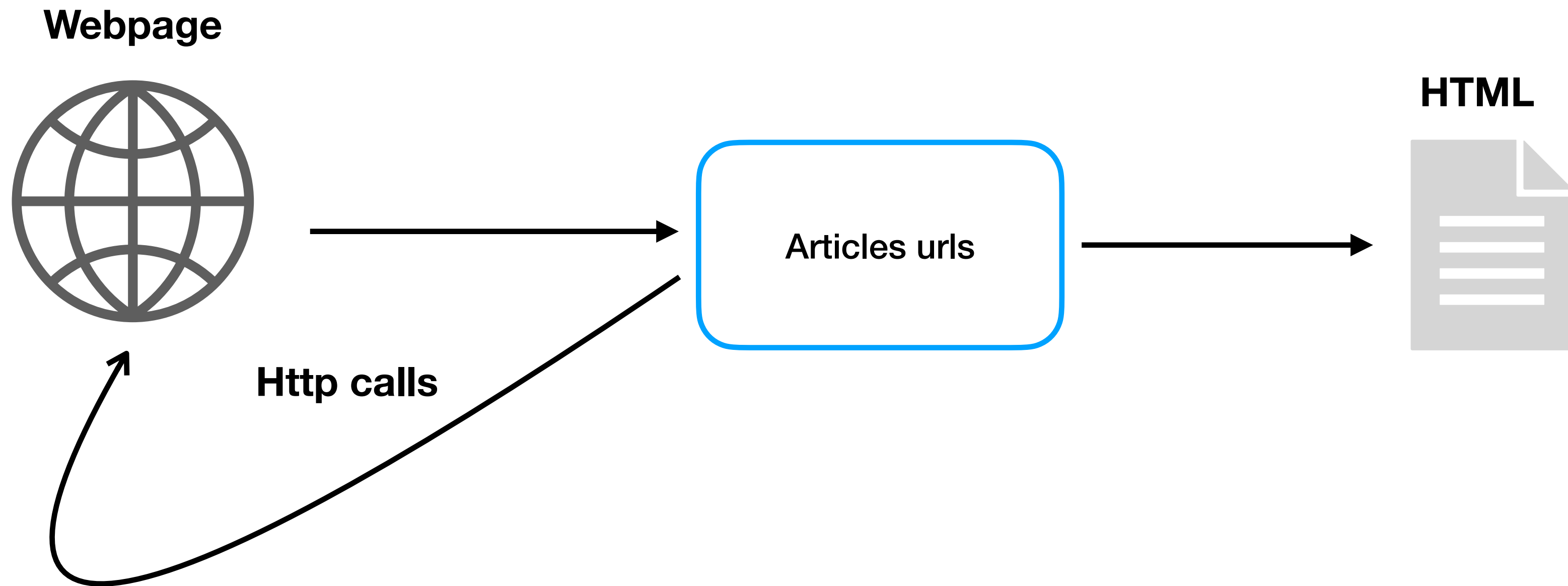


Each web-page needs a different web-scrapper due to the different html tags that it contains

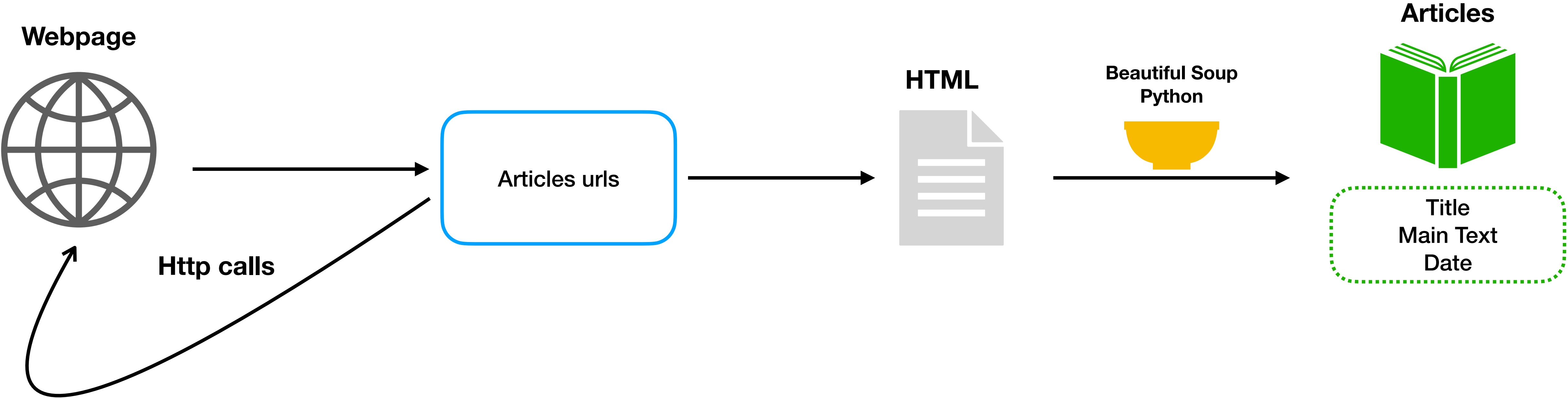
Each web-page needs a different web-scrapper due to the different html tags that it contains



Each web-page needs a different web-scrapper due to the different html tags that it contains



Each web-page needs a different web-scrapper due to the different html tags that it contains



Natural Language processing toolkit to interpreter and process the data

Natural Language processing toolkit to interpreter and process the data

Articles



Title
Main Text
Date

Natural Language processing toolkit to interpreter and process the data

Articles



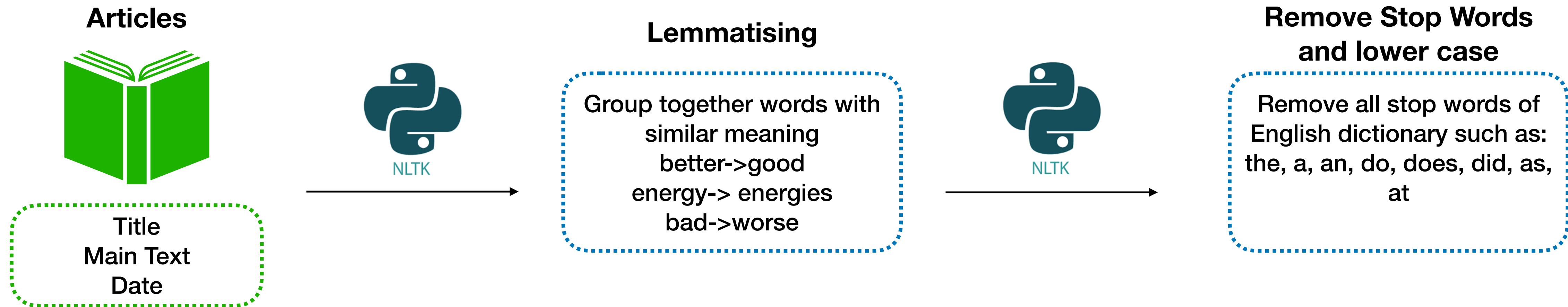
Title
Main Text
Date



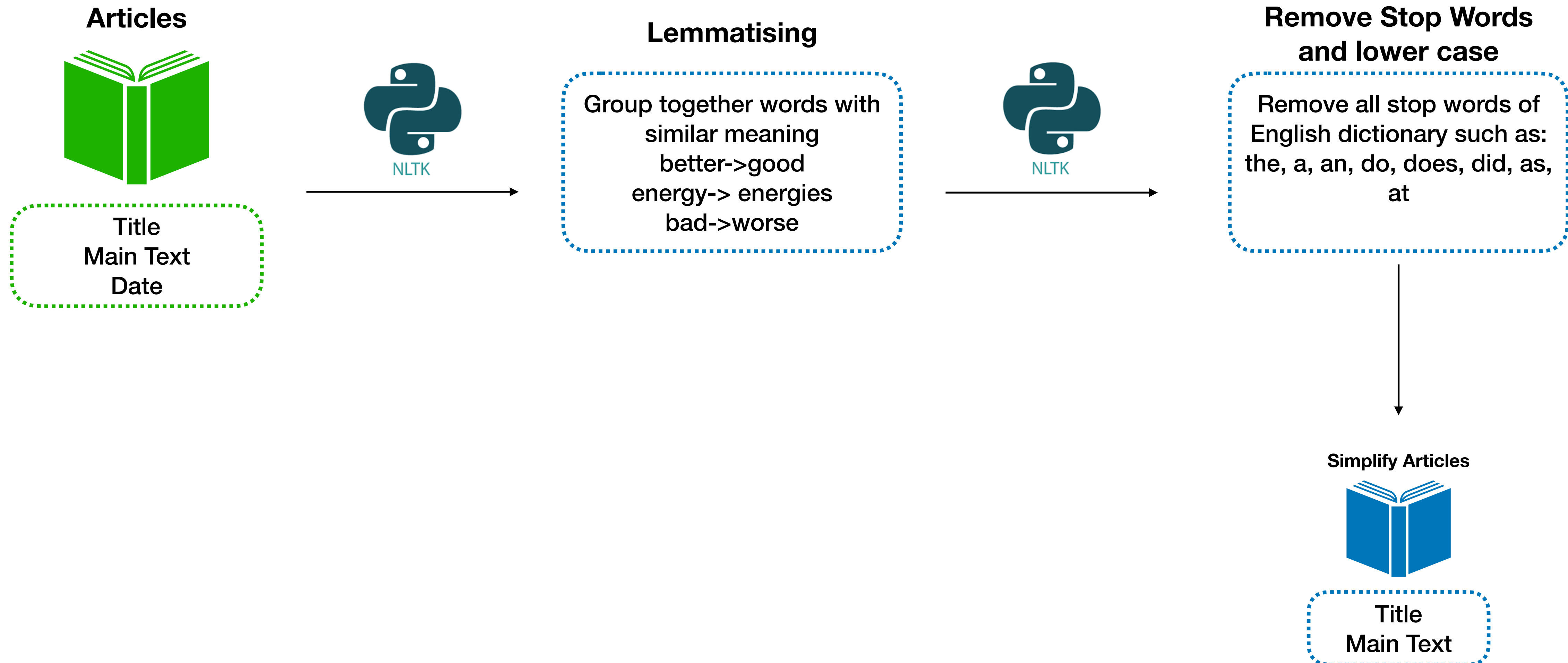
Lemmatizing

Group together words with
similar meaning
better->good
energy-> energies
bad->worse

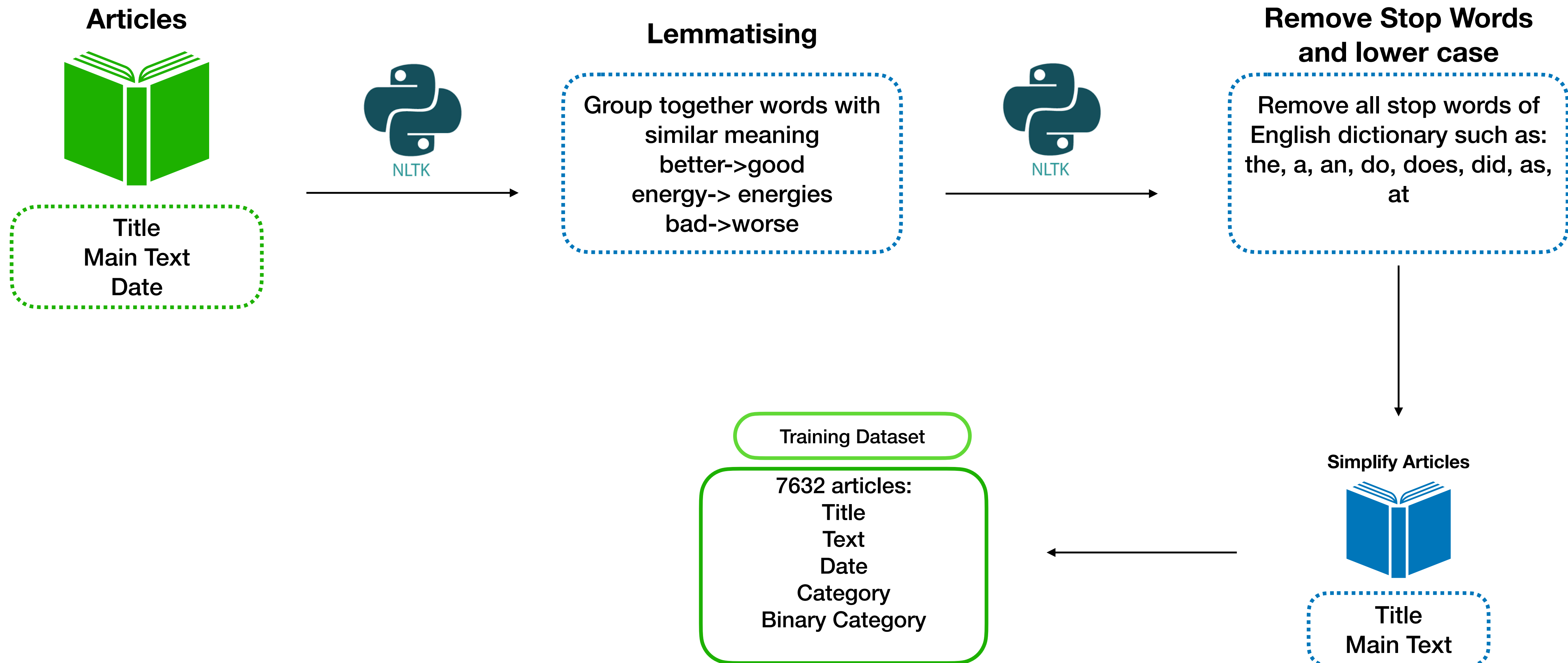
Natural Language processing toolkit to interpreter and process the data



Natural Language processing toolkit to interpreter and process the data



Natural Language processing toolkit to interpreter and process the data



Training Dataset Explanation

Machine Learning and Classification Problems

Training Dataset Explanation

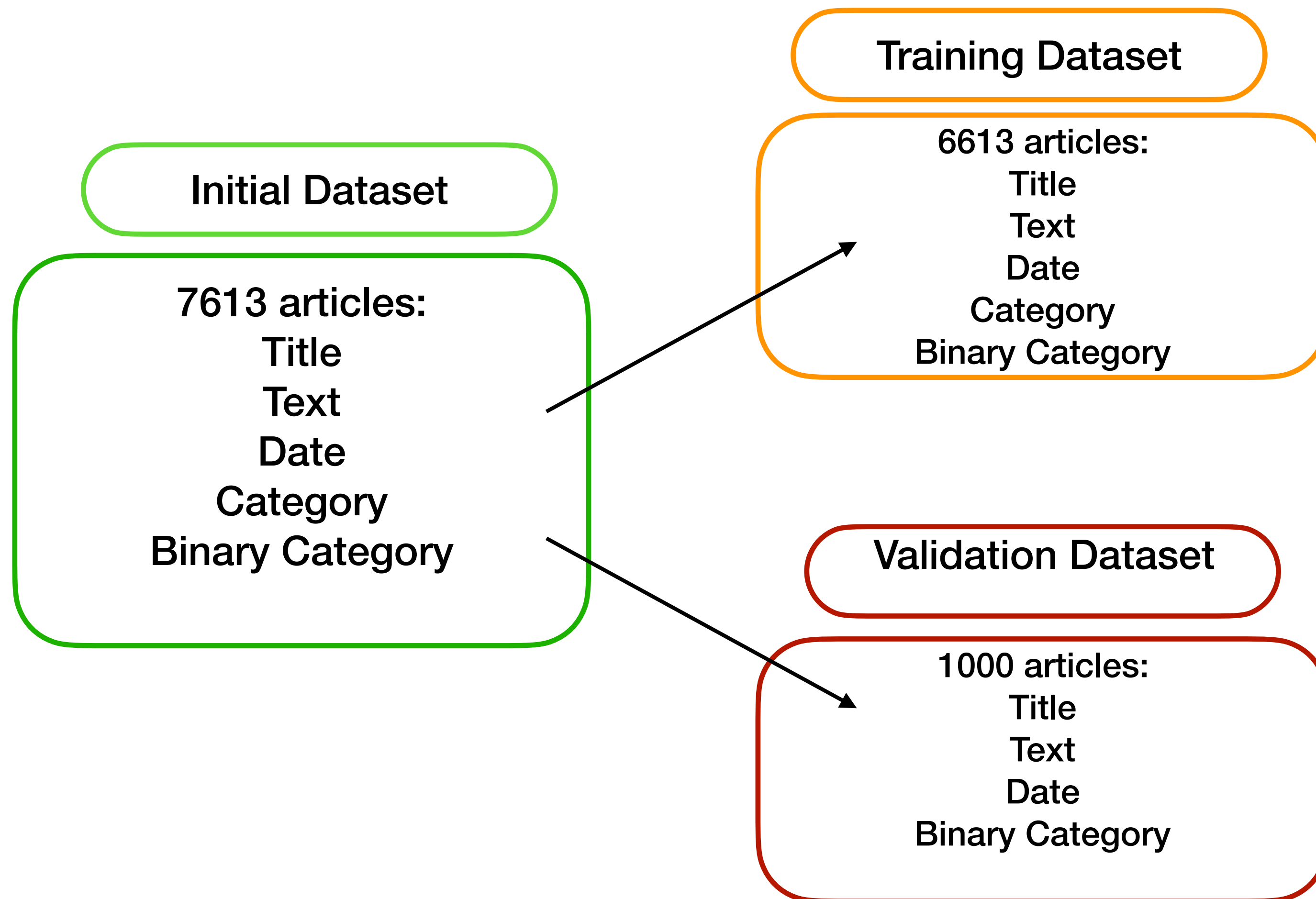
Machine Learning and Classification Problems

Initial Dataset

7613 articles:
Title
Text
Date
Category
Binary Category

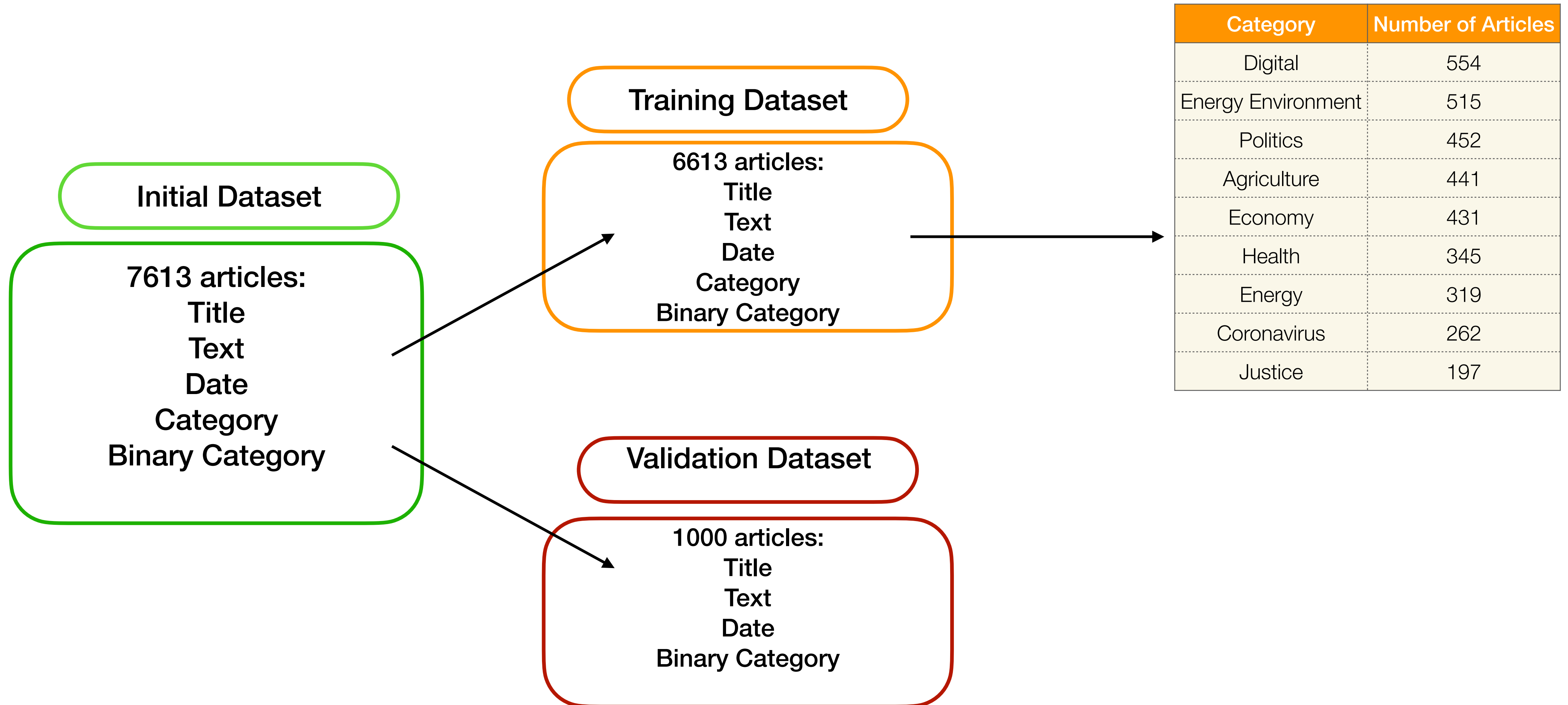
Training Dataset Explanation

Machine Learning and Classification Problems



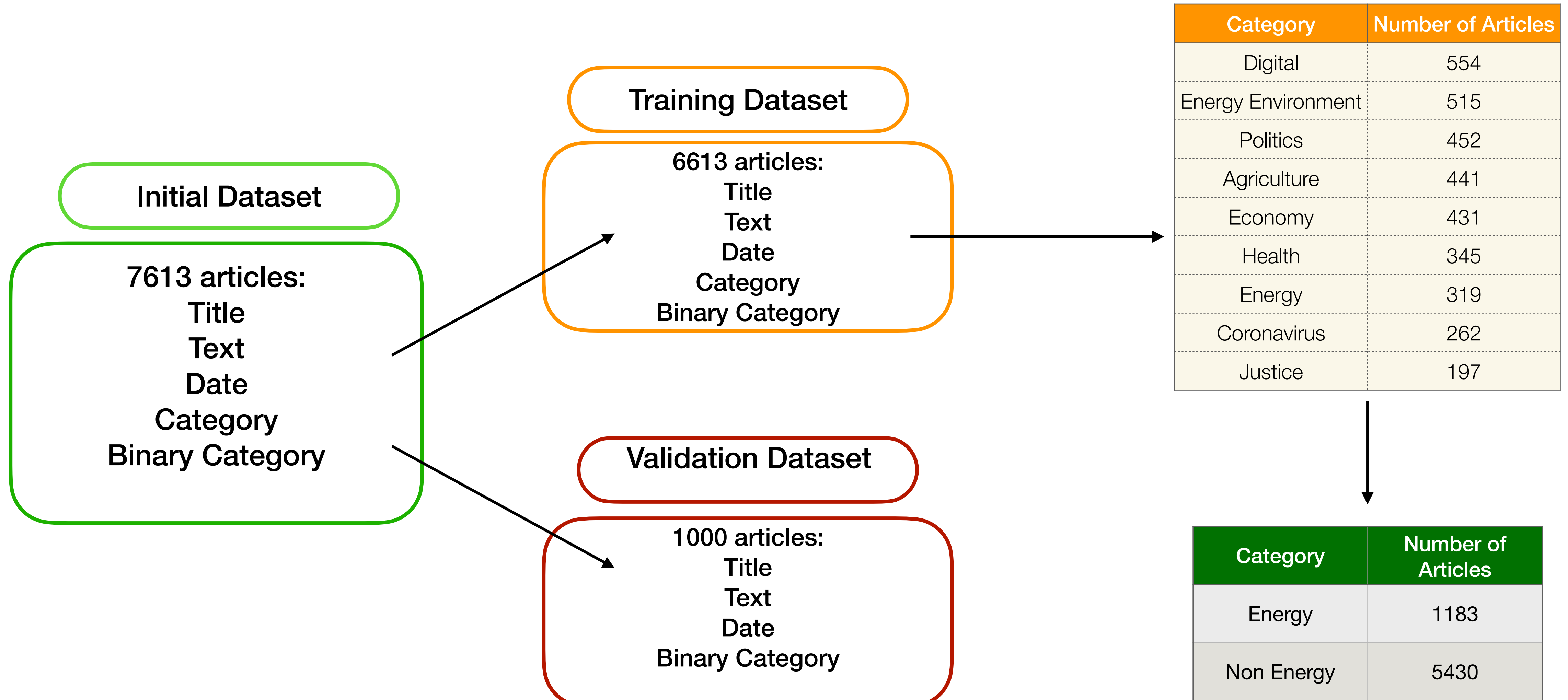
Training Dataset Explanation

Machine Learning and Classification Problems



Training Dataset Explanation

Machine Learning and Classification Problems



Decision of the different categories

Most frequent words in the non-energy , non-environment category

Decision of the different categories

Most frequent words in the non-energy , non-environment category

Most Frequent Words	Occurrences
EU	20377
european	17502
commission	6753
minister	5869
goverment	5271
us	5033
president	4809
people	4451
countries	4346
health	4140

Decision of the different categories

Most frequent words in the energy , environment category

Decision of the different categories

Most frequent words in the energy , environment category

Most Frequent Words	Occurrences
energy	6118
EU	5374
climate	5229
european	4611
gas	3114
carbon	2877
commission	2281
green	2234
emissions	2227
renewable	1587

Decision of the different categories

Most frequent bigrams in the non-energy , non-environment category

Decision of the different categories

Most frequent bigrams in the non-energy , non-environment category

Most Frequent Bigrams	Occurrences
european commission	3600
member states	2838
prime minister	2462
european union	2140
european parliament	1999
united states	1566
human rights	1231
der leyen	1088
von der	955
eu countries	925

Decision of the different categories

Most frequent bigrams in the energy , environment category

Decision of the different categories

Most frequent bigrams in the energy , environment category

Most Frequent Bigrams	Occurrences
european commission	1551
climate change	869
renewable energy	829
member states	796
european parliament	474
european union	451
greenhouse gas	440
fossil fuels	437
eu countries	408
green deal	408

Machine Learning Model Performances

Model Performance

	Model	Test Accuracy
0	Logistic Regression	95.46
1	Random Forest	93.04
2	Multinomial Naive Bayes	93.55
3	Support Vector Classifier	94.15
4	Decision Tree Classifier	92.84
5	K Nearest Neighbour	89.47
6	Gaussian Naive Bayes	90.22



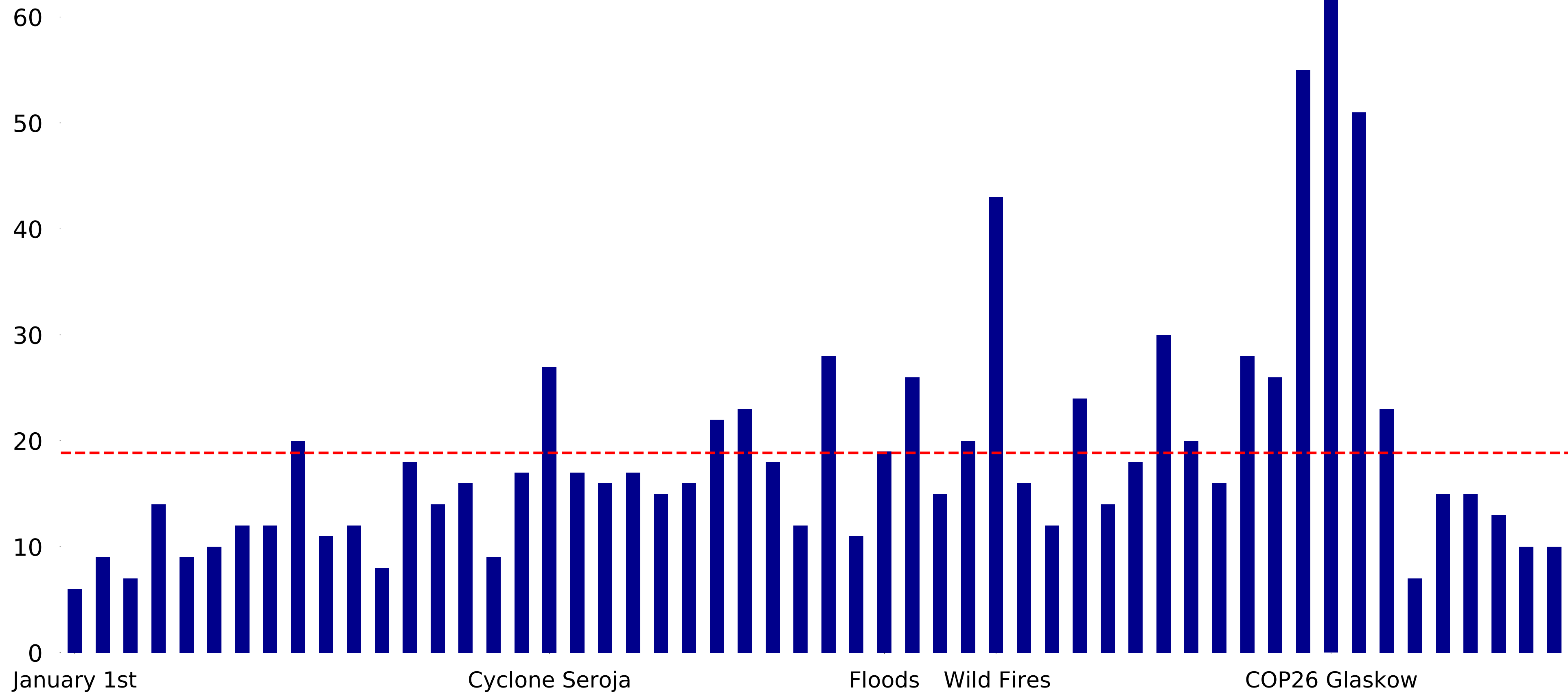
Model Performance in Validation Set

Logistic Regression
≈ 85%
Good to Excellent Model

The Guardian

Higher Attention after extreme events and pick during COP26

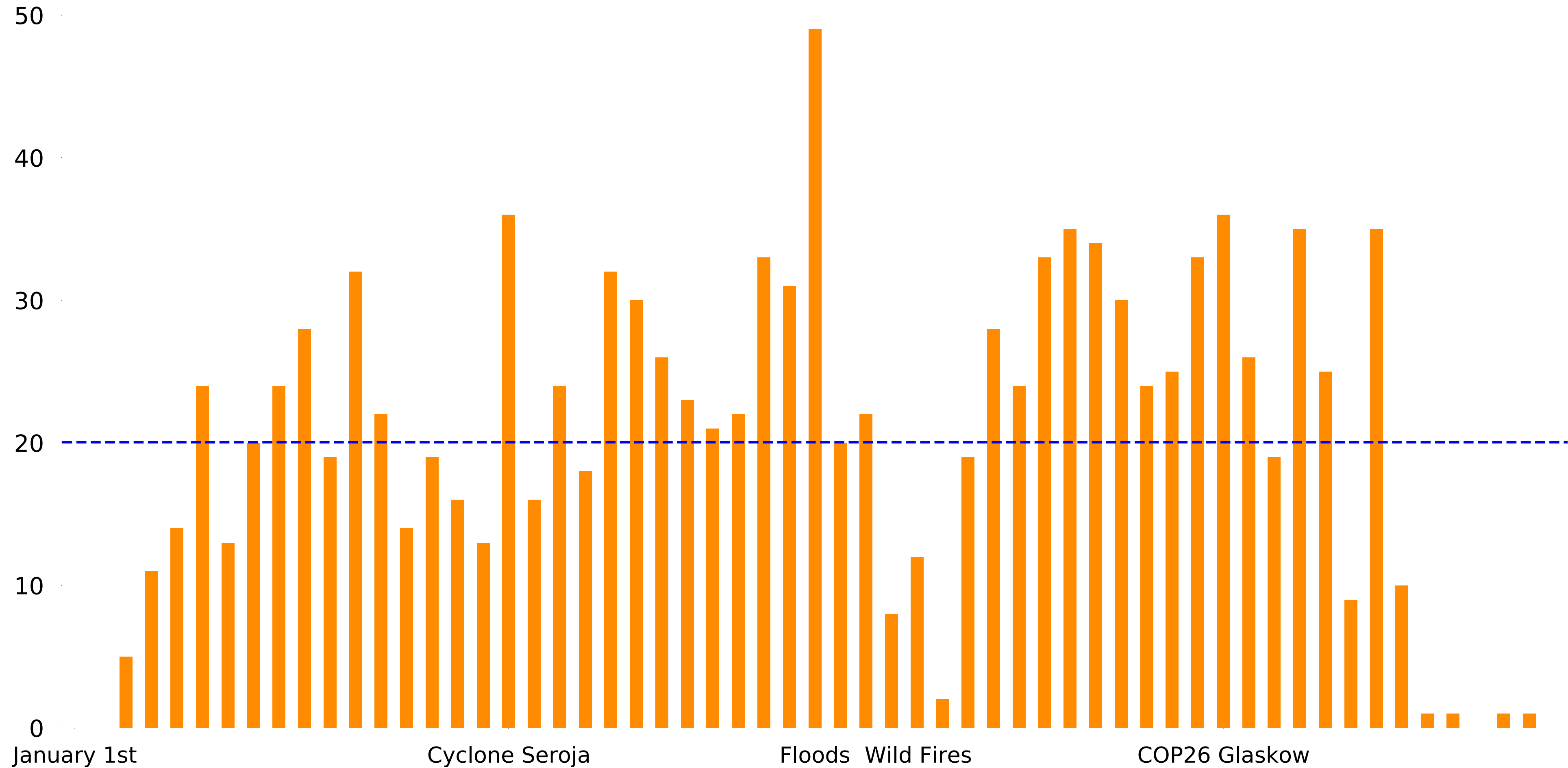
Guardian Environmental Articles 2021 per Week



Euractive

Higher attention during July Floods

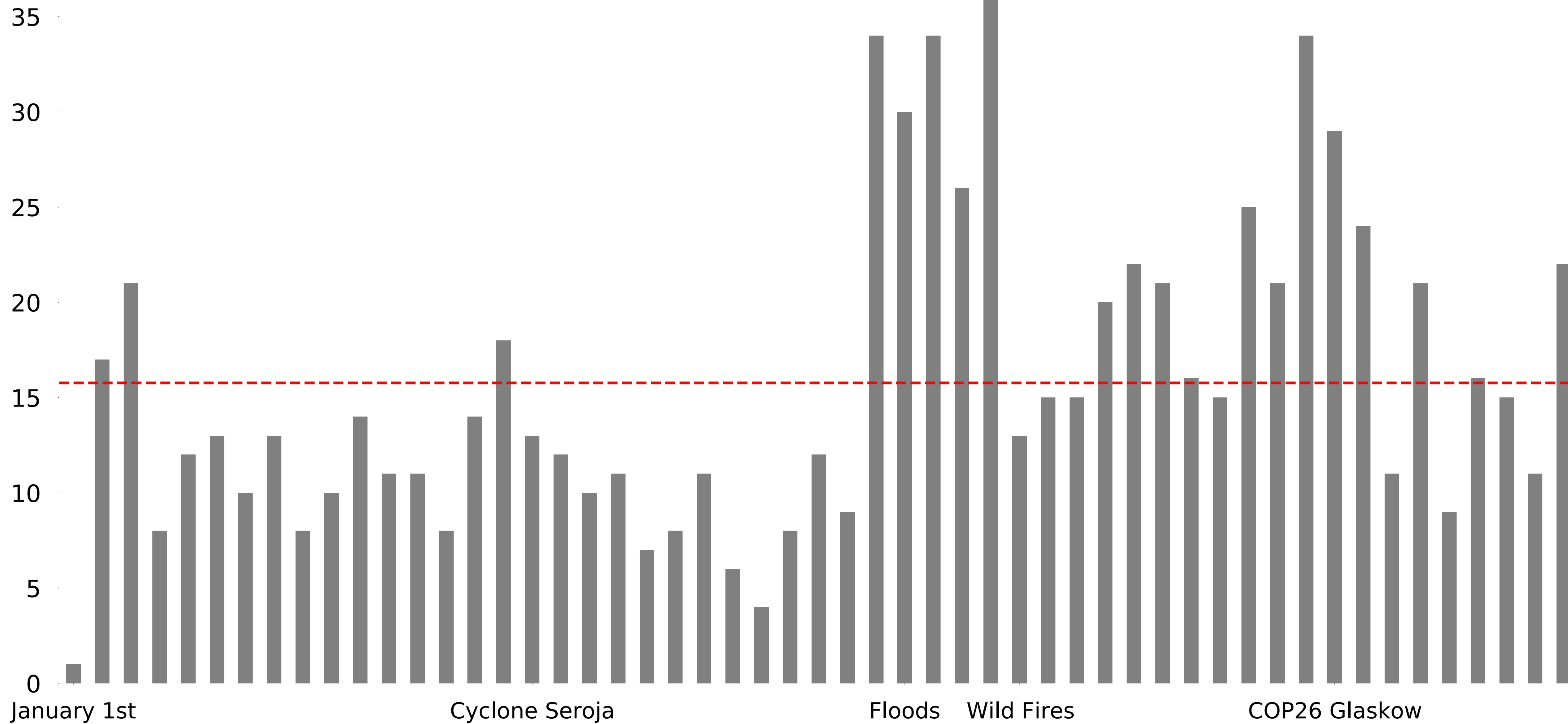
Euractive Environmental Articles 2021 per Week



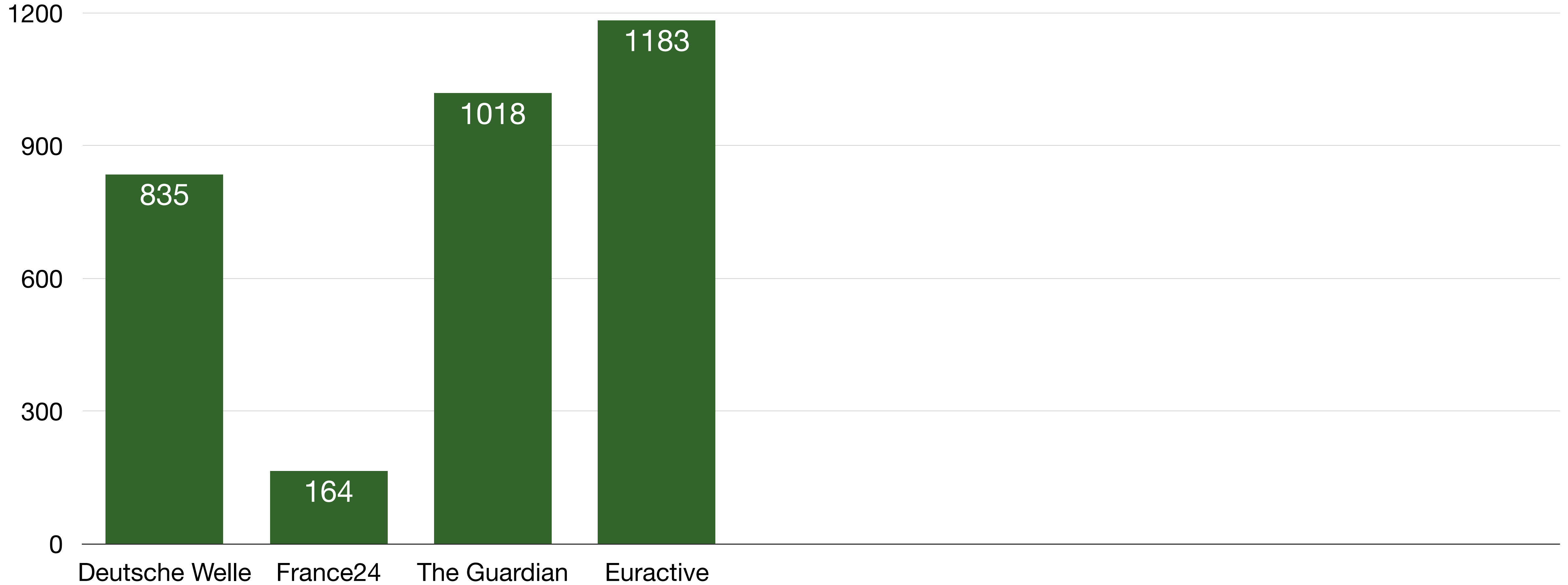
Deutsche Welle

Higher attention during July Floods

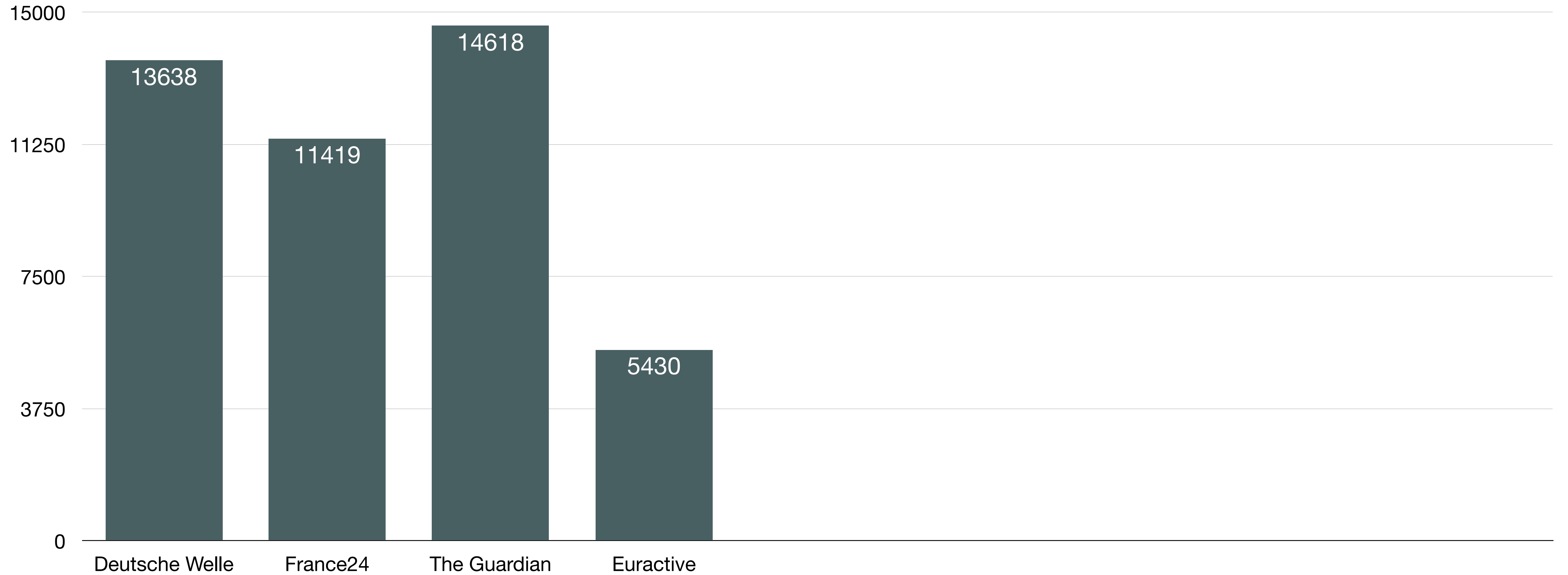
DW Environmental Articles 2021 per Week



Comparisons- Total number of Environmental Articles



Comparisons- Total Number of non-environmental articles



Conclusions

Extreme Events are followed by increased hype and attention in the media

Time Window is normally small and after a few weeks attention falls dramatically

It is important to know the time window to run campaigns and inform the citizens of the consequences of climate change

This classifier can be used also to evaluate energy policies in more/less environmental friendly

Next application: sub-category to measure the support towards each different technology

Thanks for your attention