

# USING THE PRESS AS A REAL-TIME ECONOMIC CONFIDENCE INDICATOR\*

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(\* ) The views and conclusions presented in this paper are exclusively those of the author(s) and do not necessarily reflect the position of the Central Bank of Chile or of the Board members.

# ELABORATION OF A NEWS SENTIMENT INDEX

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## OBJECTIVE:

- Additional source complementing economic activity analysis.

## ADVANTAGES:

- Real time data.
- High predictability of the economic cycle.
- Low costs compared to surveys.
- Larger population coverage.
- High effectiveness in changing conditions.

# TRANSFORMING DATA INTO (DENSE) INFORMATION USEFUL FOR ANALYSIS

- News database includes main Chilean economic and financial newspaper companies.
- About 935K news articles from 2015 to 2020 were obtained, which were reduced to 417K after the text cleaning process.
- NLP functions from the *spaCy* library in *Python* were used to facilitate the construction of the dictionary and calculation of the sentiment indicator IS-News.

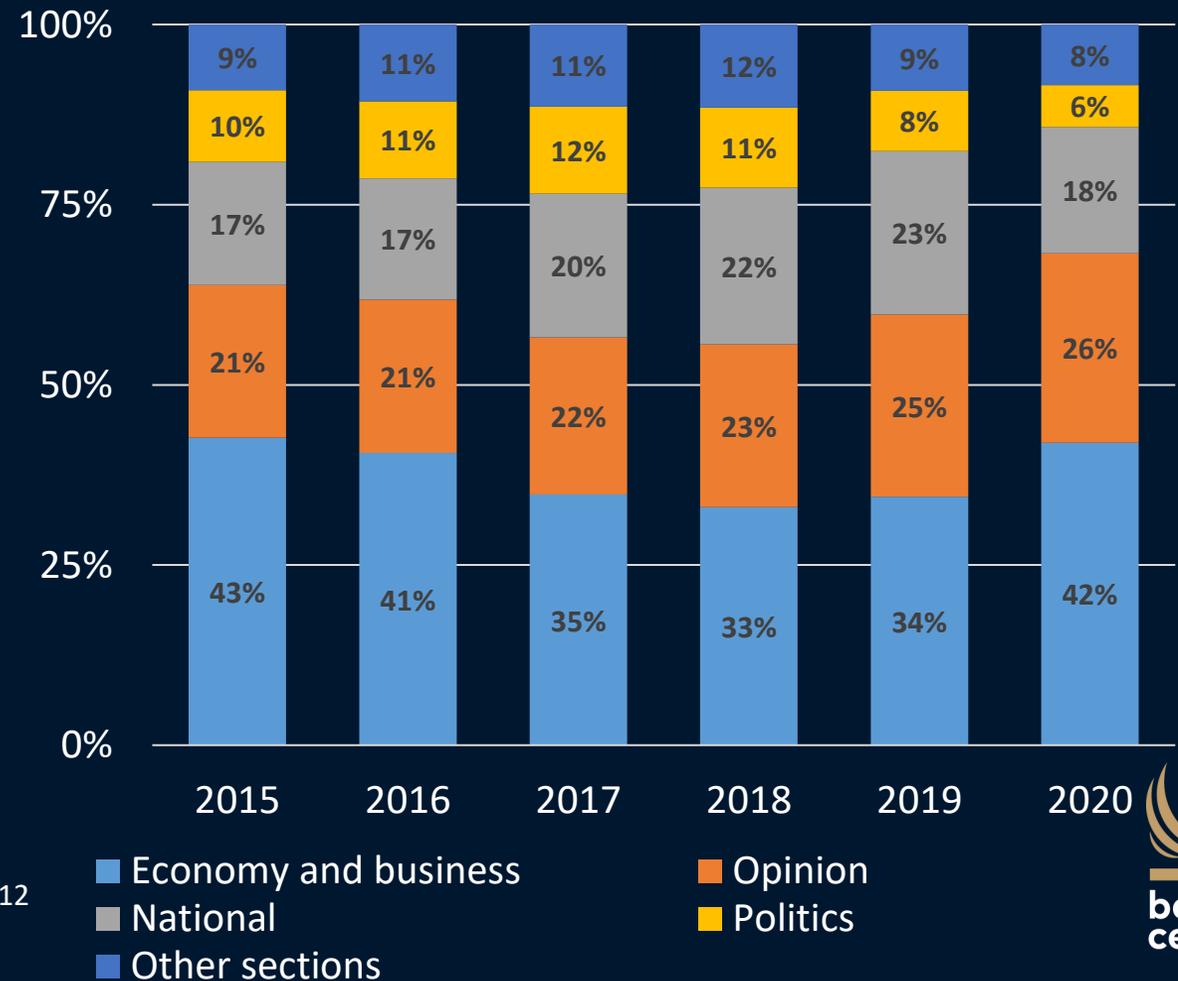


# NEWS BY MEDIA AND SECTIONS: 2015-2020

**NEWS BY MEDIA: 2015-2020**  
(filtered base; N° of news articles)



**NEWS BY SECTIONS**  
(filtered base; % of total news articles)



# **A DICTIONARY TO READ NEWS ARTICLES**



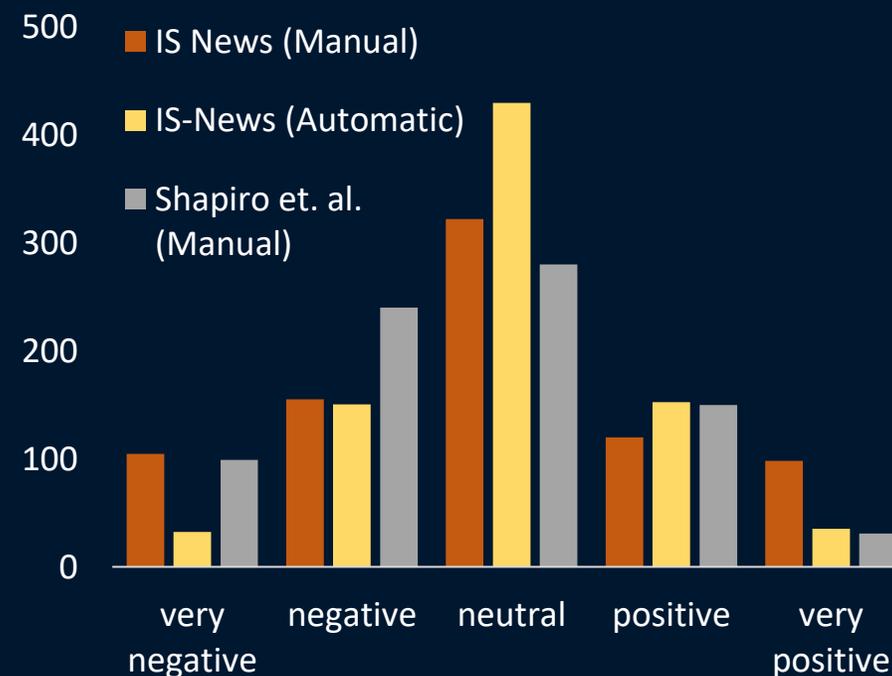
# AN EXTENSIVE NEWS DICTIONARY WAS CREATED

- **7,617 unique words were identified from the data** (2,832 verbs, 4,157 adjectives and 628 adverbs)
- **374 words were labeled with 1, -1, 0.5 or 1.5**, equivalent to 5,419 words in their various inflected forms.
- **A random set of news items was manually classified:** testing with automatic labeling; similar results were obtained (Shapiro et. al., 2020).

## SIZE OF MAIN LABELED DICTIONARIES

Dictionary	Domain	Language	Labeled words
Hu-Lui (HL)	Movies reviews	English	6,789
<b>Is News</b>	<b>Chilean news articles</b>	<b>Spanish</b>	<b>5,419</b>
Harvard General Inquirer (GI)	General English	English	4,206
Loughran-McDonald (LM)	Companies Financial Statements Report	English	2,683
Business Perceptions Report (BPR) Central Bank of Chile (CBCh)	BPR BCCh	Spanish	744
Financial Stability Report (FSR) Central Bank of Spain (CBS)	FSR CBS	Spanish	565
FSR CBCh	FSR CBCh	Spanish	361

## IS-NEWS HISTOGRAM: COMPARING MANUAL V/S AUTOMATIC LABELING



# ELABORATING THE IS-NEWS:

## ONE INDICATOR - TWO CALCULATION METHODOLOGIES

### IS-NEWS WITH DICTIONARY:



- WORD = LABELED BY DICTIONARY

- NEWS SENTIMENT INDEX (ISN):

$$ISN = \frac{\left[ \frac{\#positive}{\{1\}} + \frac{\#negative}{\{-1\}} \right] * \frac{\#modifiers}{\{0.5;1.5\}}}{\#total \ words \ within \ one \ piece \ of \ news}$$

- DAILY NEWS SENTIMENT INDEX (ISD):

$$ISD = \frac{\sum ISN}{\#news \ per \ day}$$

### WITH POINTWISE MUTUAL INFORMATION (PMI)



- WORD = PMI

$$PMI(w_i, c) = \log \left( \frac{p(w_i, c)}{p(w_i) * p(c)} \right)$$

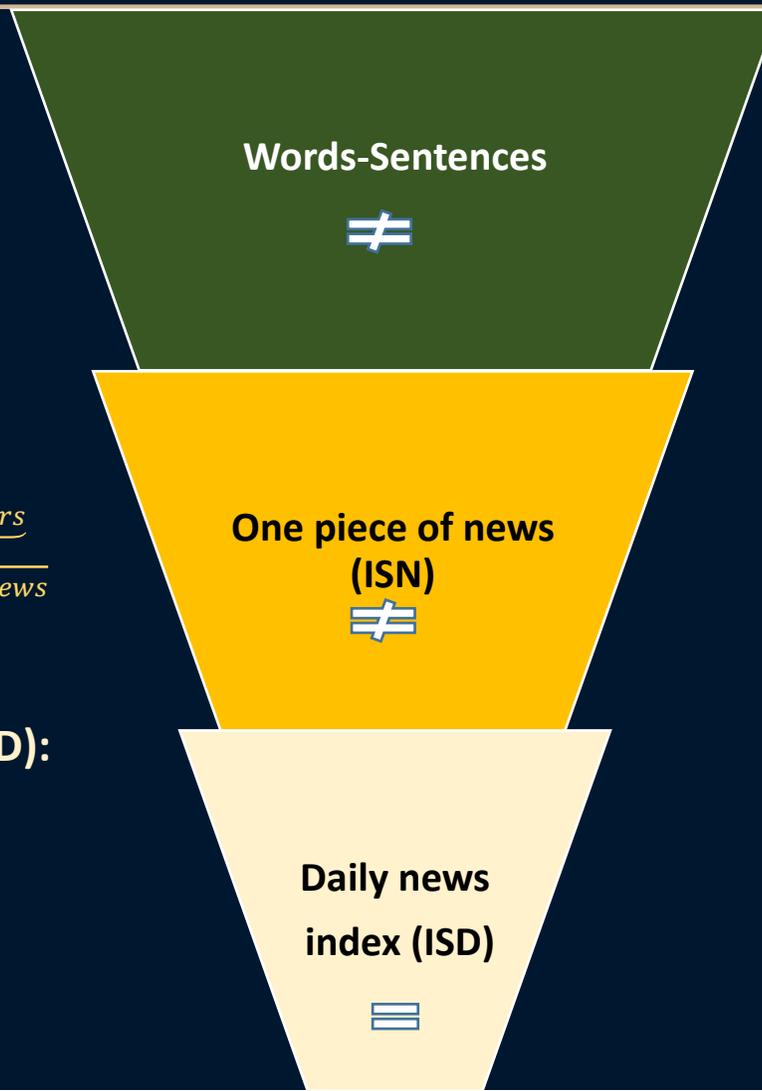
- NEWS SENTIMENT INDEX:

$$ISN^{PMI} = \overline{S(w)}$$

$$S(w_i) = PMI(w_i, POS) - PMI(w_i, NEG)$$

- DAILY NEWS SENTIMENT INDEX:

$$ISD^{PMI} = \frac{\sum ISN^{PMI}}{\#news \ per \ day}$$



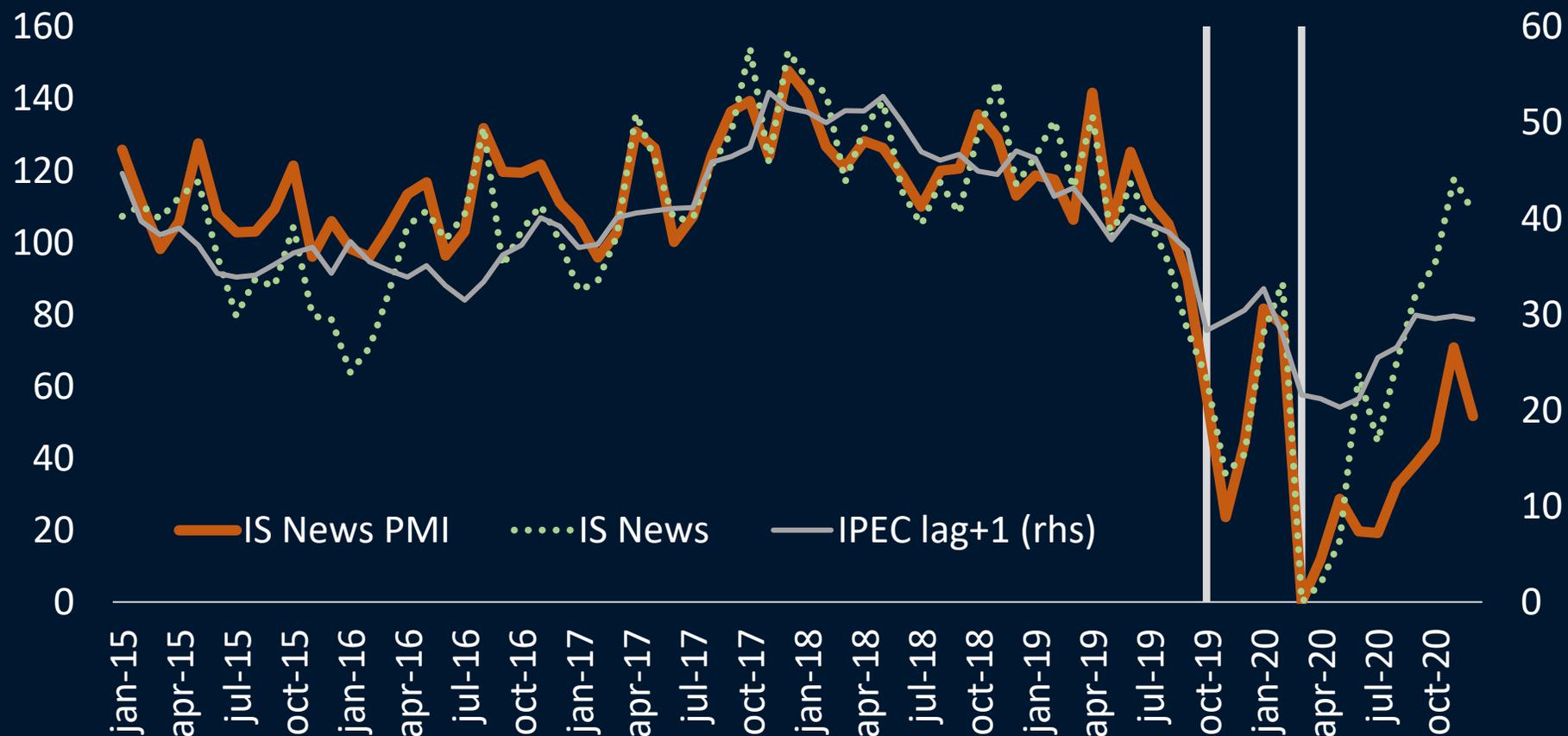


# IS-NEWS RESULTS

# IS-NEWS HIGHLY CORRELATED WITH CONSUMER SENTIMENT INDEX

## IT IMPROVES USING PMI (Pearson's R = 83%)

### IS-NEWS<sup>1</sup> v/s ECONOMIC PERCEPTION INDEX (IPEC)<sup>2</sup>



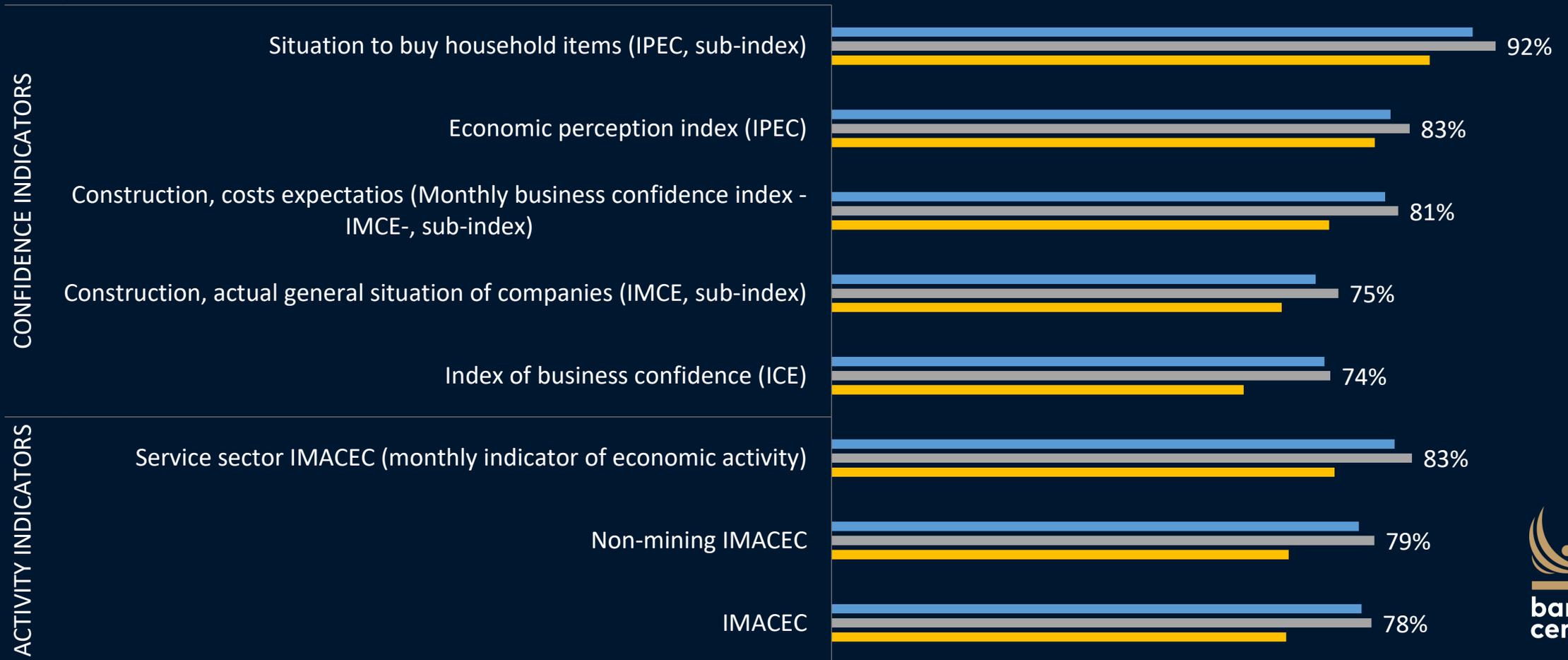
(1) Index 2015-2020 average = 100.

(2) Value above (below) 50 indicates optimism (pessimism).

# IS-NEWS CORRELATES WITH CONFIDENCE AND ACTIVITY INDICES

## PEARSON CORRELATION COEFICIENT: IS-NEWS<sup>PMI</sup> vs CONFIDENCE AND ACTIVITY INDICES (confidence indices in bases; activity indices in 12-month percent variations; %)

■ contemporaneous    ■ one month ahead    ■ two month ahead



1. **IS-News**: high correlations with confidence and activity indices, which grow with the application of the PMI.
2. **Effectiveness**: based on the construction of a dictionary of purpose, and a comparable size to those of greater use in the English language.
3. **Predictability**: anticipates economic shocks in the Chilean economy in a period of around 3 to 4 weeks.
4. **High availability and low cost**: the implementation of a news sentiment index in real time and independent from other data sources.
5. **Text mining in news articles**: many others research applications, such as topic analysis and bag of words to measure intensity.