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# **NBR, Mugur Isărescu's speeches on Covid-19 kick start**

-case study based on official press releases  
of NBR during Covid pandemic-

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# INTRODUCTION

The COVID-19 pandemic, an unprecedented global health emergency that surfaced in the Chinese city of Wuhan late 2019, fundamentally shifted the trajectory of governments around the globe. In line with the global community, Romania found itself compelled to grapple with the intricate challenges posed by the viral pandemic, as the nation confronted and navigated through the multifaceted ramifications brought forth by the contagion. With the current project we aim to explain the manner in which the representatives of the National Bank of Romania (NBR) endeavoured to provide reassurance to the populace amidst the formidable challenges posed by the COVID-19 pandemic. This involves an exploration of the communications employed by NBR vit it's governor in offering support and a sense of stability to the population during these unprecedented and trying times.

Upon the infiltration of the COVID-19 virus into Romania, the nation found itself confronted with a myriad of substantial challenges that demanded a comprehensive and immediate response to effectively address the sudden surge in cases of the infectious disease. The complex landscape of these challenges encompassed various facets, including healthcare infrastructure strain, logistical hurdles, and the imperative need for swift, well-coordinated measures to mitigate the escalating impact of the pandemic on public health and societal well-being. Hospitals strained under the influx of patients, necessitating swift adaptations and resource mobilization. The heroic efforts of healthcare professionals became the frontline defence against the pandemic, showcasing resilience and dedication in the face of adversity. The pandemic's impact on Romania's economy was profound, with sectors such as tourism, hospitality, and small businesses experiencing severe disruptions. Lockdowns, travel restrictions, and supply chain interruptions contributed to economic uncertainties, prompting the government to implement fiscal measures to mitigate the adverse effects on businesses and individuals.

Beyond the economic sphere, the pandemic brought about social and cultural changes in Romania. Social distancing measures, remote work, and lockdowns altered the dynamics of daily life, challenging traditional norms and reshaping societal behaviours. The resilience and adaptability of the Romanian people became evident as communities rallied together to support one another. In addition to providing immediate crisis management and financial measures implementation, the NBR actively shaped a course for recovery. The central bank's dedication to setting up Romania for post-pandemic prosperity was highlighted by its forward-thinking policies, cooperation with foreign partners, and emphasis on developing economic resilience.

## METHODS & RESULTS

In this particular segment of the case study, our initial focus will be directed towards presenting the methodology employed. This will entail an exploration of the underlying code, accompanied by a discussion of its anticipated functionalities and objectives. Subsequently, our narrative will transition to an analysis of the ensuing outcomes, delving into the intricacies of the data essential for documenting and capturing the insights derived from our investigative processes. This structured approach aims to provide a comprehensive and detailed account, offering an understanding of both the theoretical underpinnings and the practical manifestations of our research endeavours.

We started by importing the necessary tools and extensions to make our programme function.

```
✓ [5] import io
0s      import pandas as pd
      import bs4
      import urllib
      import matplotlib.pyplot as plt
      import re
      from nltk.corpus import stopwords
      import os
      import matplotlib.pyplot as plt
      import re
      import seaborn as sns
      import itertools
      import collections
      import networkx as nx
      from nltk.corpus import stopwords
      from nltk.tokenize import RegexpTokenizer
      from PIL import Image
      import PIL.ImageOps
      import random
      from wordcloud import ImageColorGenerator

      from os import path
      from PIL import Image
      import numpy as np
      from wordcloud import WordCloud, STOPWORDS

      from gensim import corpora, models
      import gensim

      from vaderSentiment.vaderSentiment import SentimentIntensityAnalyzer
```

We then attached the unfiltered speech in a text document so that the programme could read it.

Afterwards we assigned the operation of opening the file to the "f" key and then instructed it to read it.

```
file_path = "/content/BNR COVID _stacked.txt"

# Open the file with error handling
with open(file_path, 'r', encoding='utf-8', errors='replace') as f:
    data = f.read()

print(data)
```

We decided that filtering is required, so we started with the stop words command from the English dictionary. We also wrote a few lines of code to remove quote marks and uppercase to prepare the content for future analysis.

```
stop_words = stopwords.words("english")
from nltk import bigrams

expression = "[^a-zA-Z0-9 ]"
cleantextCAP = re.sub(expression, '', data)
cleantext = cleantextCAP.lower() # lower case
print(cleantext)
```

We then choose to split the words and create a small countdown by their side to track how many times those words appear; this step will assist us in creating a plot that highlights the primary words used. We also established an output file to contain the changed text.

```
text_file = open("BNR COVID _stacked.txt", "w")
text_file.write(str(cleantext))
text_file.close()

dat = list(cleantext.split())
dict1 = {}
for i in range(len(dat)):
    word = dat[i]
    dict1[word] = dat.count(word)

keys = list(dict1)
filtered_words = [word for word in keys if word not in stopwords.words('english')]
dict2 = dict((k, dict1[k]) for k in filtered_words if k in filtered_words)

print (dict2)
```

To further filter the content, we created a list of the top 7 most often used words.

```
def SequenceSelection(dictionary, length, startindex = 0):

    lengthDict = len(dictionary)
    if length > lengthDict:
        return print("length is longer than dictionary length");
    else:
        d = dictionary
        items = [(v, k) for k, v in d.items()]
        items.sort()
        items.reverse()
        itemsOut = [(k, v) for v, k in items]

        highest = itemsOut[startindex:startindex + length]
        dd = dict(highest)
        wanted_keys = dd.keys()
        dictshow = dict((k, d[k]) for k in wanted_keys if k in d)

        return dictshow;
dictshow = SequenceSelection(dictionary = dict2, length = 7, startindex = 0)

print(dictshow)
```

Now that we've finished filtering and isolating the terms, we're ready to use the top 7 words to create the plot we discussed.

```
▶ n = range(len(dictshow))
plt.bar(n, dictshow.values(), align='center')
plt.xticks(n, dictshow.keys())
plt.title("Most frequent Words")
plt.savefig("FrequentWords.png", transparent=True)
```

Using this data, we were also able to create a word cloud that emphasises the most used terms and saves them in a .jpg format in the main folder.

```
root_path = os.getcwd()
with open(path.join(root_path, 'BNR COVID _stacked.txt'), 'r', encoding='utf-8', errors='ignore') as outout_file:
    text = outout_file.readlines()

stopwords = set(STOPWORDS)
stopwords.add("said")

wc = WordCloud(max_words=1000,
               stopwords=stopwords, mode='RGBA', background_color=None)

wc.generate(text[0])

wc.to_file(path.join(root_path, "/content/Mugur.Isarescu.png"))

plt.figure()
plt.imshow(wc, interpolation='bilinear')
plt.axis("off")

plt.show()
```

As this exercise became more and more interesting, we decided to add a mask to the word cloud which worked out, after all.

```
def orange_color_func(word, font_size, position, orientation, random_state=None, **kwargs):
    return "hsl(24, 99%, %d%%)" % random.randint(40, 70)

mugur_isarescu = np.array(Image.open("Mugur.Isarescu.jpeg"))

wc = WordCloud(background_color="white", mask=mugur_isarescu,
               random_state=5, max_words=2000).generate(text[0])
plt.imshow(wc.recolor(color_func=orange_color_func, random_state=5))
plt.axis("off")
wc.to_file("Mugur.Isarescu.png")
```

The final step was to calculate the sentiment score to determine how the speech was being perceived.

```
from textblob import TextBlob
sentiment = TextBlob(clean_text)
print("Score", sentiment.sentiment.polarity)
```

Now putting everything we presented to action we have following results:

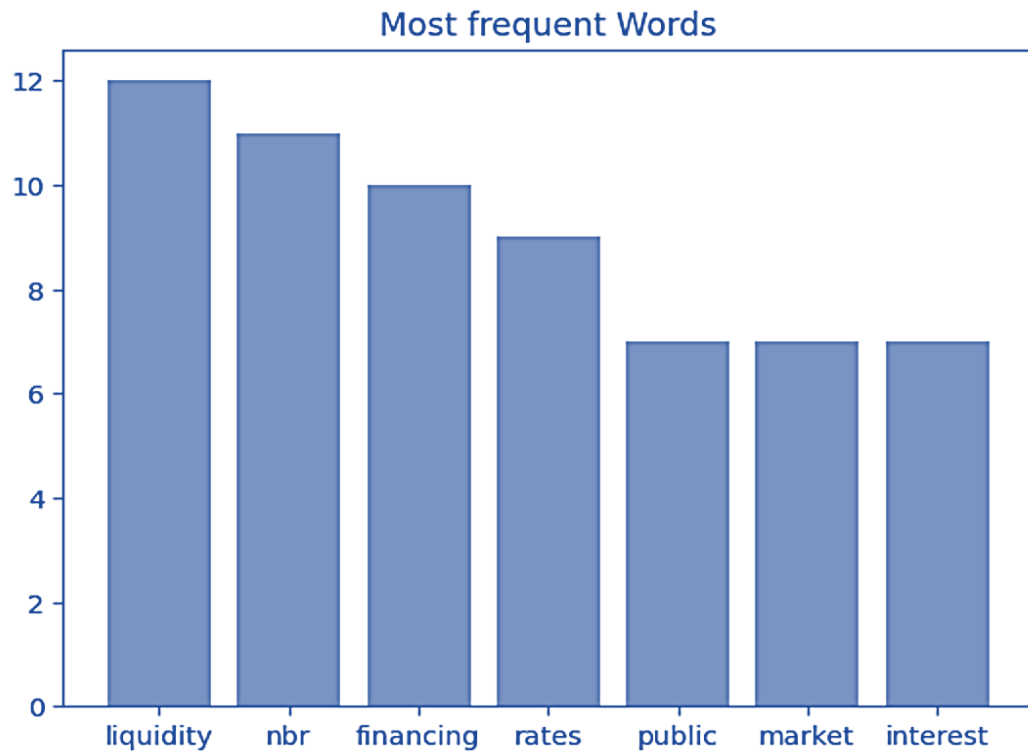
## 1. The text started to look like this after the filters have been applied

{'peak': 1, 'tensions': 1, 'generated': 1, 'covid19': 2, 'crisis': 3, 'monetary': 4, 'banking': 4, 'financial': 6, 'field': 1, 'overcome': 1, 'whereas': 1, '1120': 1, 'march': 3, '2020': 4, 'period': 6, 'cash': 6, 'withdrawals': 1, 'credit': 4, 'institutions': 2, 'nbr': 11, 'purpose': 1, 'meeting': 3, 'household': 1, 'corporate': 1, 'demand': 3, 'reached': 1, 'record': 1, 'high': 3, 'lei': 5, '44': 1, 'billion': 4, 'twice': 1, 'much': 1, 'december': 1, '2019': 1, 'winter': 1, 'holidays': 1, 'season': 1, 'declined': 2, 'sharply': 1, 'past': 3, 'days': 4, 'value': 1, 'vault': 1, 'held': 1, 'increased': 1, 'meaning': 1, 'cover': 1, 'sources': 1, 'requirements': 2, 'making': 1, 'payments': 1, 'smoothly': 1, 'feeding': 1, 'atmsthe': 1, 'nbrs': 2, 'reserve': 1, 'fund': 1, 'remained': 3, 'within': 4, 'prudential': 1, 'limits': 2, 'risen': 1, 'slightly': 2, 'currently': 1, 'bottlenecks': 2, 'recommends': 1, 'however': 1, 'companies': 1, 'households': 3, 'use': 1, 'cashless': 1, 'payment': 2, 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'transactions': 1, 'carried': 1, 'bases': 1, 'option': 1, 'relates': 1, 'concern': 1, 'strict': 1, 'connection': 1, 'sustainably': 1, 'lowering': 1, 'preventing': 1, 'excessive': 1, 'volatility': 1, 'unnecessary': 1, 'depreciation': 1, 'currencythis': 1, 'approach': 1, 'enabled': 1, 'along': 1, 'gradual': 2, 'reduction': 1, 'relative': 1, 'stabilisation': 1, 'realities': 2, 'become': 1, 'obvious': 1, 'hence': 1, 'saw': 2, 'eight': 1, 'security': 1, 'issues': 1, 'totalling': 1, '83': 1, 'markedly': 1, 'oversubscribed': 1, 'indicating': 1, 'adequately': 1, 'financed': 1, 'decline': 2, 'consolidate': 1, 'effect': 1, 'cheaper': 1, 'companiesfirms': 1, '3m': 1, 'robor': 1, 'benchmark': 1, 'loans': 1, 'dropped': 1, '244': 1, '18': 1, '215': 1, '16': 1, 'reference': 1, 'downward': 1, 'path': 1, 'steepened': 1, 'april': 1, 'maturities': 1, 'year': 1, 'even': 1, 'values': 1, 'prior': 1, 'outbreak': 1, 'global': 1, 'turmoil': 1, '10year': 1, 'returned': 1, 'readings': 1, 'seen': 1, 'first': 1, 'half': 1, 'marchthe': 1, 'still': 1, 'higher': 1, 'compared': 1, 'applicable': 1, 'czechia': 1, 'poland': 1, 'hungary': 1, 'consequence': 1, 'cause': 1, 'romanias': 3, 'economic': 2, 'twin': 1, 'deficits': 1, 'widest': 1, 'fiscal': 2, 'deficit': 2, 'eu': 1, 'pandemicgenerated': 1, 'requirement': 1, 'refinancing': 1, 'prevailing': 1, 'put': 1, 'upward': 1, 'pressure': 1, 'borrowings': 1, 'ratings': 1, 'agencies': 1, 'assessments': 2, 'commission': 1, 'contribute': 1, 'distinction': 1, 'cannot': 1, 'disregardedfor': 1, 'ahead': 1, 'actions': 1, 'remain': 1, 'stance': 1, 'risks': 2, 'anticipate': 1, 'clearly': 1, 'related': 1, 'health': 1, 'developments': 1, 'therefore': 1, 'monitor': 1, 'update': 1, 'steer': 1, 'towards': 1, 'safeguarding': 1, 'maintaining': 1, 'sustainable': 1, 'carefully': 1, 'calibrated': 1, 'deter': 1, 'saving': 1, 'source': 1, 'budgetary': 1, 'sector': 1, 'would': 1, 'amplified': 1, 'failed': 1, 'consider': 1, 'permanently': 1, 'changing': 1, 'precautionary': 1, 'purposes': 1, 'ecb': 1, 'agreed': 1, 'setting': 1, 'provide': 1, 'euro': 2, 'measure': 1, 'intended': 1, 'address': 1, 'potential': 1, 'urgent': 1, 'dysfunctions': 1, 'might': 1, 'emerge': 1, 'regional': 1, 'impact': 1, 'pandemic': 1, 'intensified': 1}

## 2. Our top 7 most frequent words are:

{'liquidity': 12, 'nbr': 11, 'financing': 10, 'rates': 9, 'public': 7, 'market': 7, 'interest': 7}

3. Our graph shows the 7 most used words

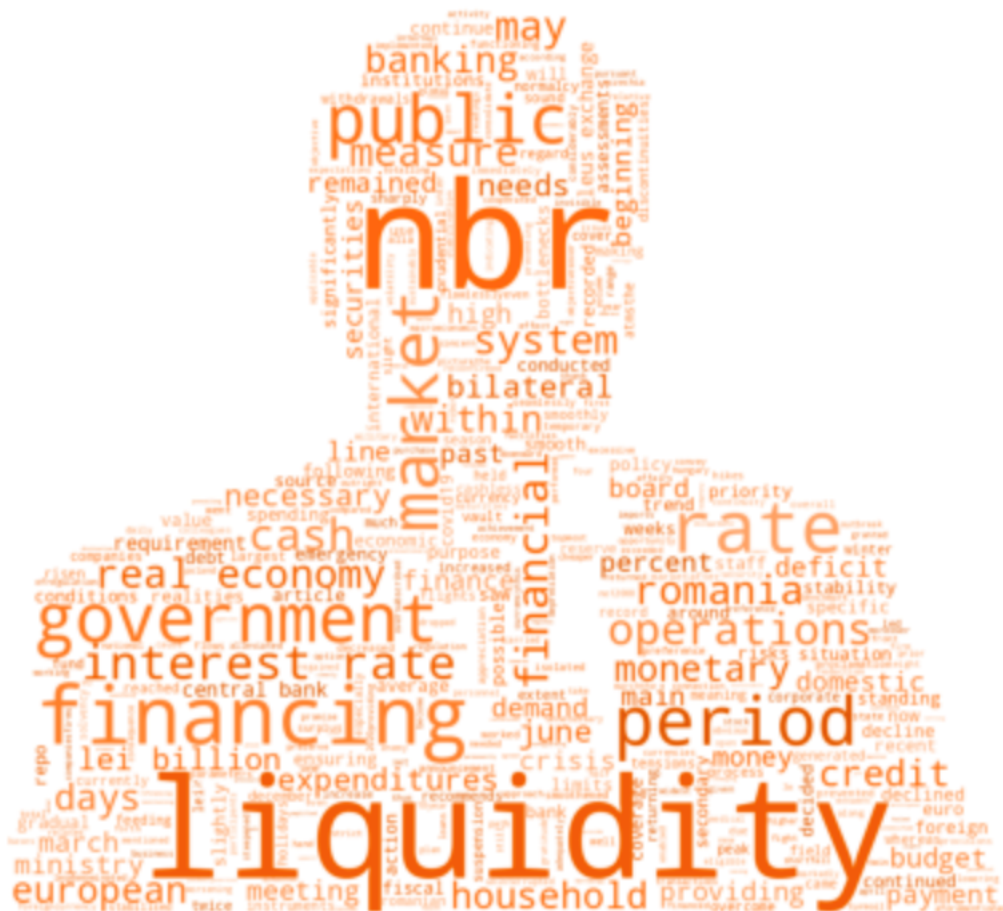


4. The wordcloud representation:





5. Adding Mr. M. Isărescu's NBR governor mask to the word cloud:



5. And finally the sentiment score, which in the context of sentiment analysis, is a numerical representation of the sentiment expressed this public statement being calculated using natural language processing (NLP) techniques, and it typically reflects the overall sentiment as positive, negative, or neutral. The sentiment score itself is often a continuous value ranging from -1 to 1, with the following interpretation:

- negative sentiment: Score close to -1.
- neutral sentiment: Score close to 0.
- positive sentiment: Score close to 1.

In the current analysis the sentiment our sentiment score is rather neutral having a value close to zero :

Score 0.018598484848484854

## CONCLUSIONS

After a thorough examination of the sentiment analysis, we can discern that its impact on the public sentiment was predominantly neutral. This assessment is derived from a dual perspective: scrutinizing the language used within the dataset and evaluating the perceived messages conveyed. Our sentiment analysis yielded a score of 0.0185. Noteworthy words frequently employed in the dataset, such as "liquidity," "NBR," "financing," "rates," and "interest," underscored an atmosphere of heightened uncertainty, suggesting a prevailing inclination among the public to refrain from engaging in financial transactions, obtaining loans, or making substantial commitments.

The sentiments conveyed through the analysed data reflect a broader context of global circumstances, indicating a period characterized by widespread uncertainty at various levels. The speeches examined during the analysis serve as mirrors to the overarching atmosphere of uncertainty, resonating with the prevailing uncertainties evident in worldwide economic conditions. In summation, the dataset portrays a time of heightened ambiguity, and the language used in the speeches appears to echo the uncertainties prevailing globally during the period under consideration.

Liquidity -the most used word in the NBR governor's interventions- refers to the availability of liquid assets (e.g., cash or easily convertible assets) that individuals, businesses, and financial institutions can use to meet their short-term financial obligations, being of key importance ; several factors linked to liquidity can be put in foreground :

- **Economic Uncertainty:** the pandemic brought about significant economic uncertainty, with lockdowns, disruptions to supply chains, and changes in consumer behaviour impacting businesses. Maintaining sufficient liquidity became crucial for businesses to navigate through economic uncertainties and ensure continuity.
- **Financial Stability:** liquidity is a key component of financial stability. As the pandemic unfolded, ensuring the stability of financial systems became a priority for governments and central banks. Discussions around liquidity often centred on measures taken by financial institutions and regulatory bodies to maintain stability in the face of economic challenges.
- **Business Survival:** for businesses, especially those in sectors directly impacted by lockdowns and restrictions, maintaining liquidity was critical for survival. The ability to cover operational expenses, payrolls, and other immediate financial obligations became a significant concern.
- **Financial Resilience:** individuals and households also faced financial uncertainties, and the concept of liquidity extended to personal finances. The ability to access liquid assets became crucial for weathering the economic challenges brought about by the pandemic.