



Conflict in Ukraine. NLP and Sentiment Analysis

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April 2022

Process and Tools

Data:

Data downloaded from Kaggle consists of 227 513 tweets. All tweets were collected on one day - the 27th of February, 2022.

Methodology:

Data cleaning and EDA

Text preprocessing: Regex, NLTK, spaCy

Text standardizing: CountVectorizer and TfidfVectorizer

Topic Modeling: LSA, NMF, LDA

Sentiment Analysis: spaCy and word2vec



NLP. NMF technique

Topic 1. The Russian invasion of Ukraine.

- ukraine, russia, invasion, say, stand, country, attack, president, talk, fight

"The hawks are already trying to exploit the Russian invasion, saying a shortfall in spending is leaving us vulnerable. Not true."

Topic 2. Military News and summary

- russian, ukrainian, force, soldier, military, tank, army, troop, destroy, city

"Russian troops destroyed a commercial oil base near Vasylykiv. This is an ecological catastrophe not only for Ukraine but also for all world"

Topic 3. People from all over the world are helping Ukrainians

- people, support, world, country, ukrainian, help, stand, need, like, just

"My beautiful Kyiv. This is what we were all afraid of. May God protect Ukrainians and its defenders tonight"

Topic 4. Protests against the war, stop the war

- war, stop, russia, world, end, peace, make, protest, start, want

"Praying for peace between Ukraine and Russia. All over the world please stop the war:"

Topic 5. Nuclear threat

- putin, russia, nuclear, president, trump, say, world, alert, force, think

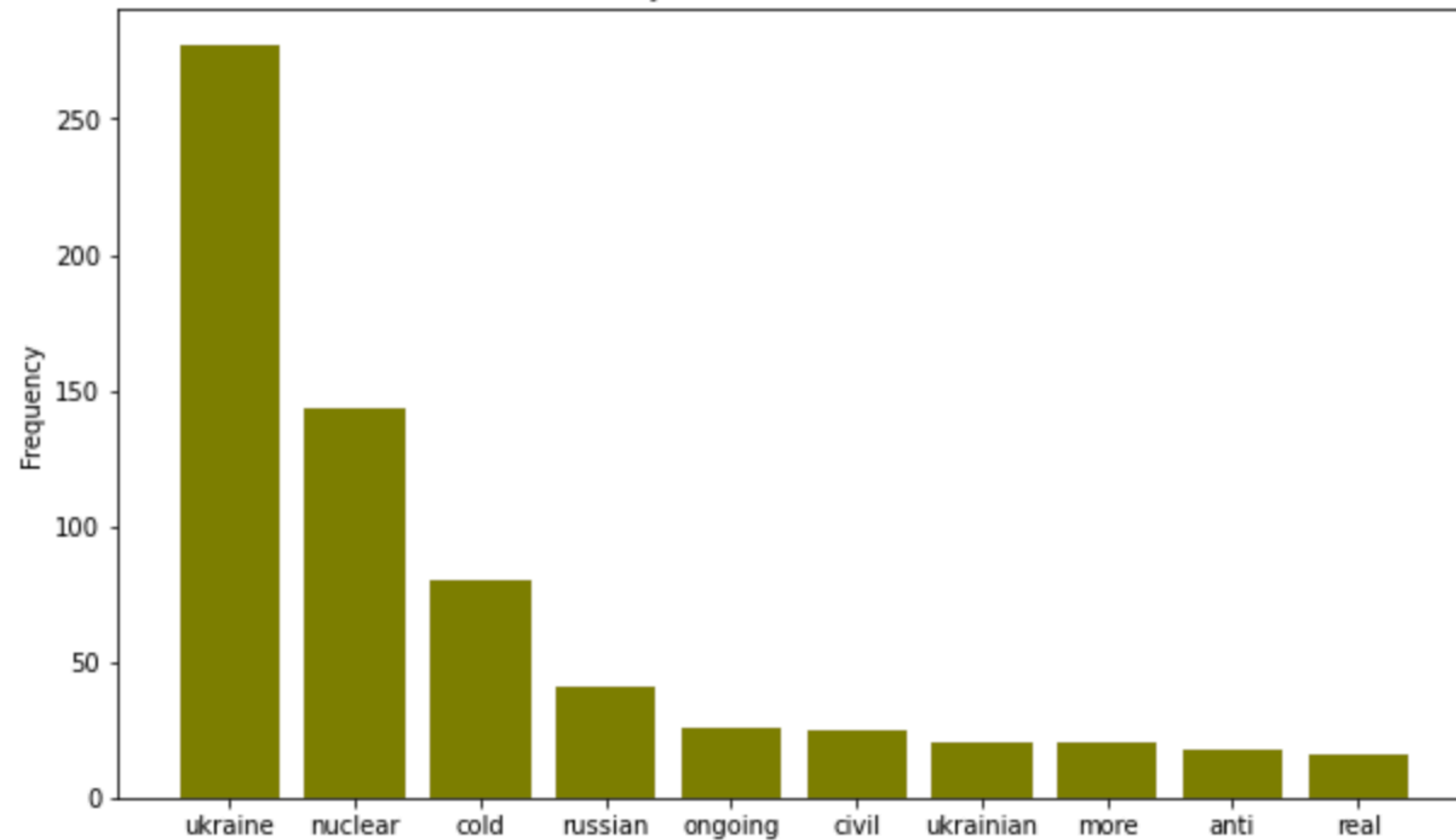
"We need to prevent eco disasters, what if a nuclear power plant is next"

NLP. LDA technique

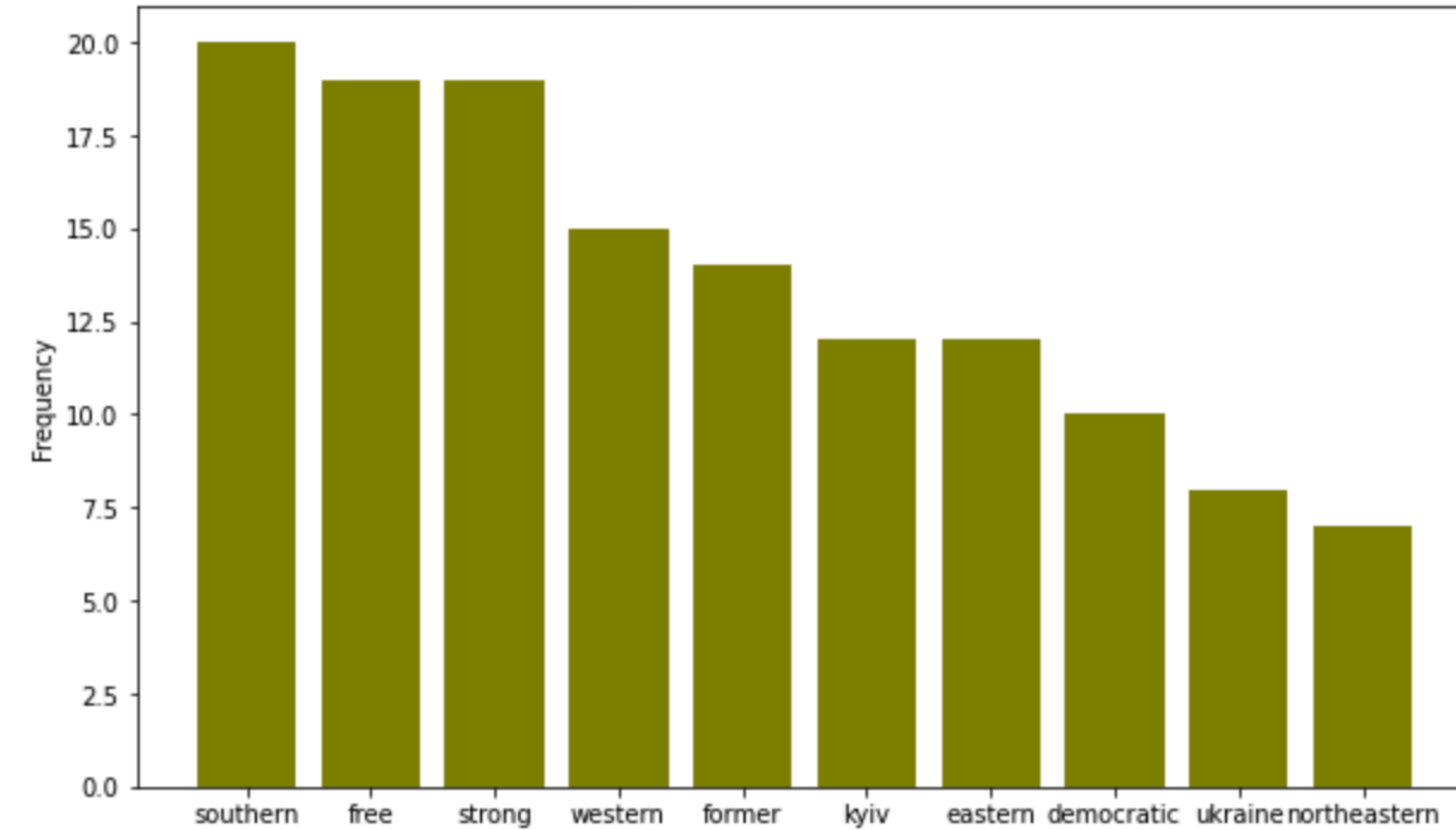
Topic 1. People support Ukraine, help Ukrainians	Topic 2. Military News and summary	Topic 3. Tweets about presidents	Topic 4. Tweets about Putin	Topic 5. Nuclear Threat
0.062*"people" + 0.061*"support" + 0.056*"ukraine" + 0.044*"stand" + 0.041*"help" + 0.031*"man" + 0.031*"let" + 0.028*"leave" + 0.027*"country" + 0.025*"like"	0.127*"russian" + 0.060*"ukrainian" + 0.048*"military" + 0.043*"force" + 0.034*"soldier" + 0.033*"army" + 0.030*"video" + 0.030*"destroy" + 0.030*"ukraine" + 0.030*"kyiv"	0.054*"president" + 0.051*"say" + 0.040*"live" + 0.036*"protest" + 0.036*"troop" + 0.035*"send" + 0.033*"just" + 0.030*"win" + 0.029*"ukraine" + 0.028*"lose"	0.063*"putin" + 0.058*"russia" + 0.053*"war" + 0.038*"world" + 0.033*"eu" + 0.030*"ukraine" + 0.030*"day" + 0.030*"think" + 0.029*"sanction" + 0.024*"end"	0.042*"nuclear" + 0.041*"need" + 0.041*"right" + 0.036*"stop" + 0.029*"want" + 0.029*"look" + 0.027*"way" + 0.026*"use" + 0.026*"peace" + 0.025*"happen"

Sentiment based on adjectives

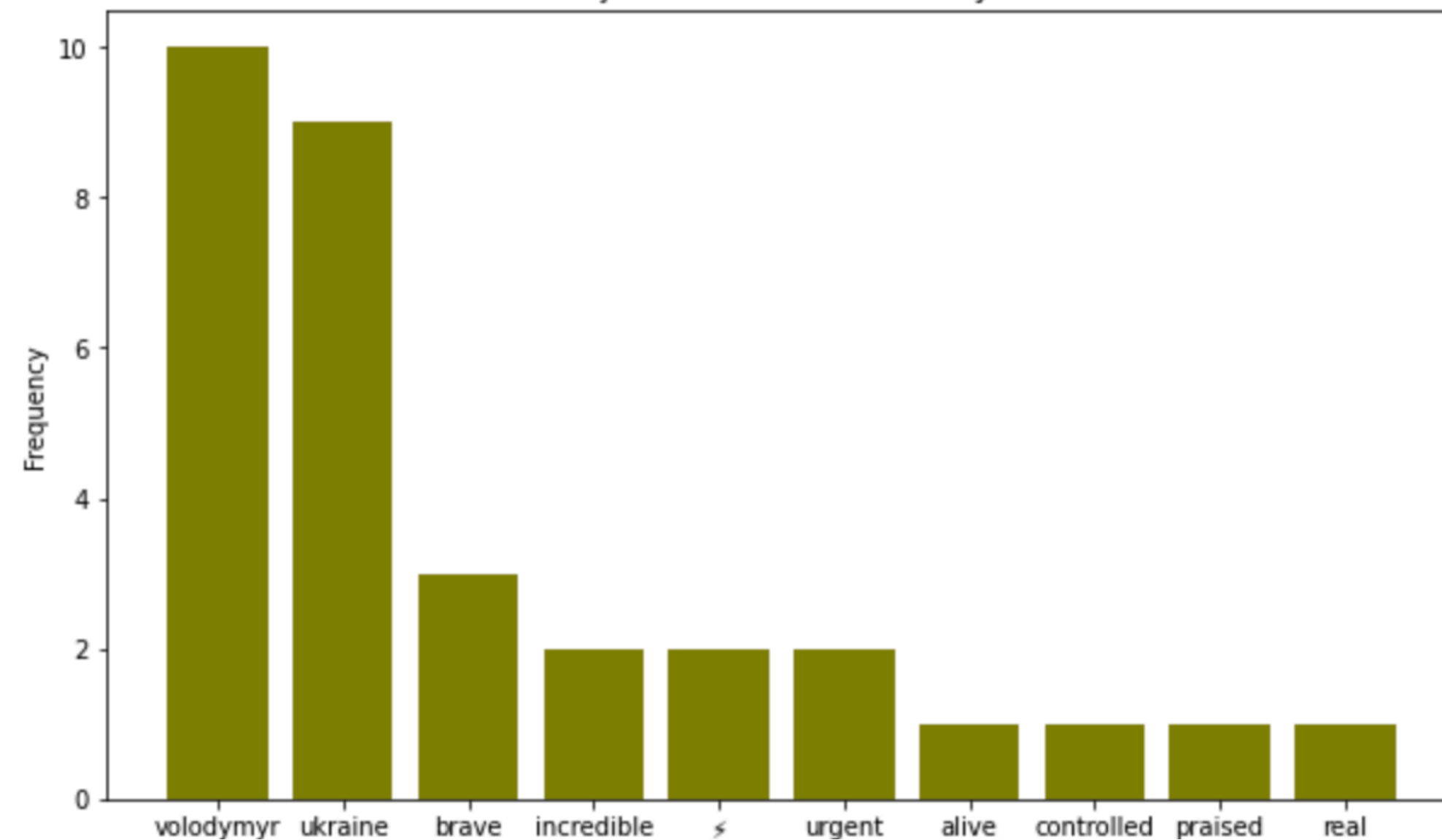
Adjectives for word 'War'



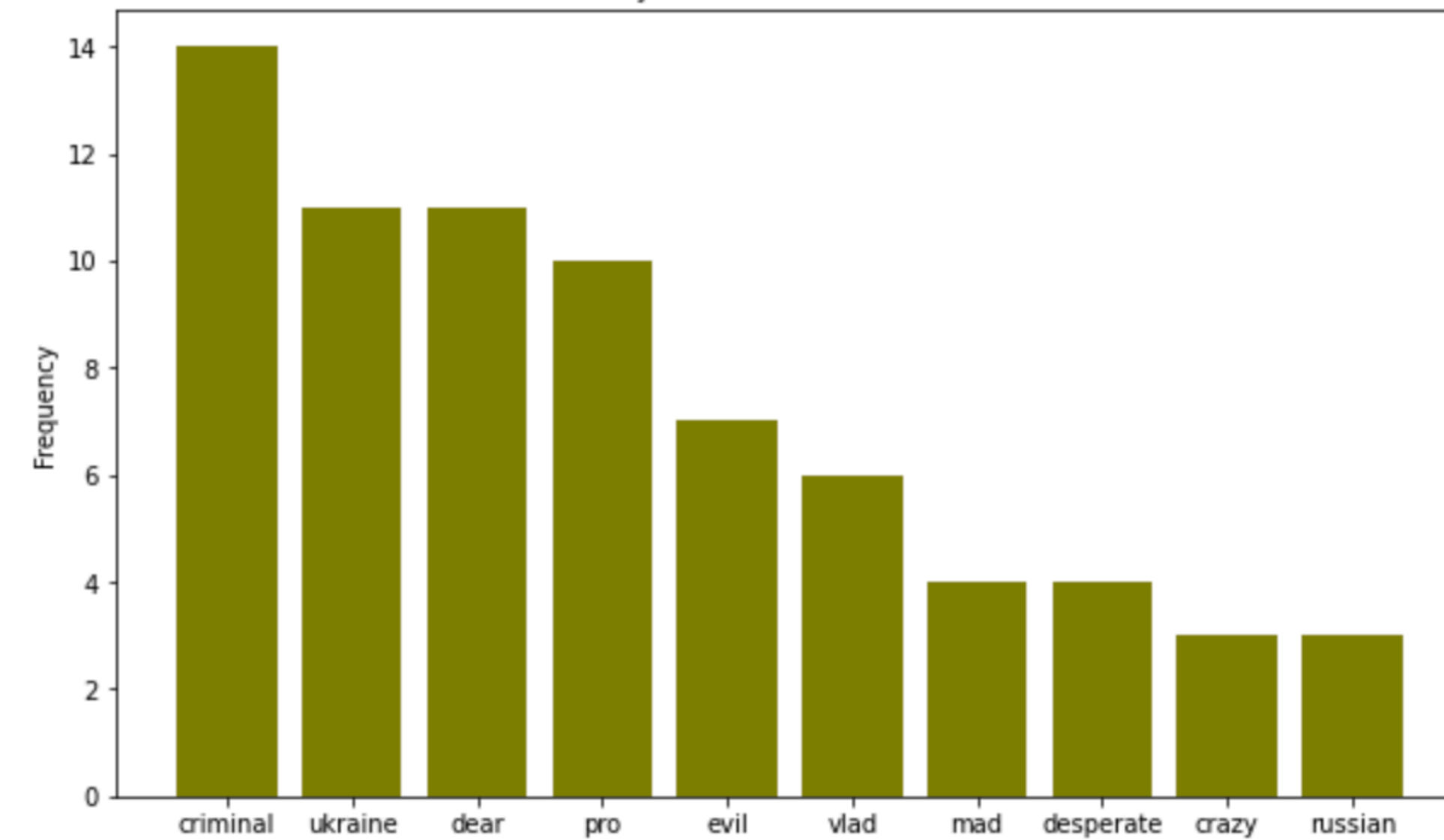
Adjectives for word 'Ukraine'



Adjectives for word 'Zelensky'



Adjectives for word 'Putin'



Sentiment based on word2vec

Putin

```
[('puppet', 0.9181651473045349),  
 ('threaten', 0.8797967433929443),  
 ('hitler', 0.8618333339691162),  
 ('coward', 0.8510791063308716),  
 ('weak', 0.838253915309906),  
 ('warmonger', 0.8302947282791138),  
 ('dictator', 0.8267050981521606),  
 ('madman', 0.8253138661384583),  
 ('put', 0.8200377225875854),  
 ('mad', 0.8180135488510132)]
```

Russia

```
[('expansion', 0.9201341271400452),  
 ('sanction', 0.9124718904495239),  
 ('isolate', 0.9036275744438171),  
 ('pressure', 0.8824303150177002),  
 ('impose', 0.8791989684104919),  
 ('tie', 0.8717527389526367),  
 ('escalate', 0.8647485971450806),  
 ('provoke', 0.8612870573997498),  
 ('deal', 0.8596240878105164),  
 ('removal', 0.852574348449707)]
```

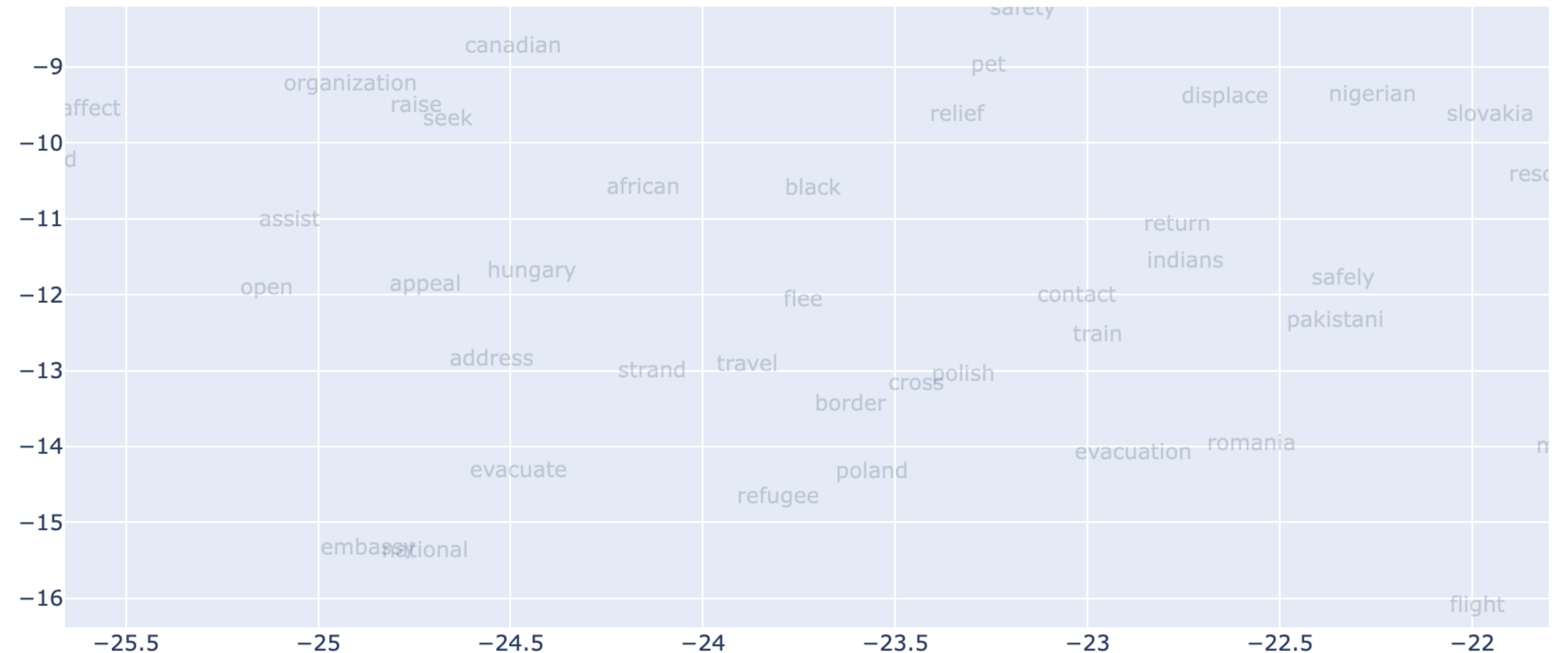
Zelensky

```
[('zelenskyy', 0.9416937232017517),  
 ('volodymyr', 0.9349132776260376),  
 ('president', 0.924403965473175),  
 ('zelenskiy', 0.8791467547416687),  
 ('his', 0.8758799433708191),  
 ('democratically', 0.8147981762886047),  
 ('meet', 0.8068607449531555),  
 ('praise', 0.7997029423713684),  
 ('himself', 0.7886671423912048),  
 ('extort', 0.7689980268478394)]
```

Poland

```
[('refugee', 0.9619964361190796),  
 ('cross', 0.9604359269142151),  
 ('passport', 0.9576801061630249),  
 ('passage', 0.9311464428901672),  
 ('rescue', 0.930264413356781),  
 ('polish', 0.9235228300094604),  
 ('bus', 0.9206966757774353),  
 ('travel', 0.918583869934082),  
 ('romania', 0.9185347557067871),  
 ('entry', 0.9030534625053406)]
```

word2vec plot



A close-up photograph of a hand holding a small flag with light blue and yellow diagonal stripes. The background is a blurred crowd of people, suggesting a public event or gathering. The text "Thank you" is overlaid in the center of the image.

Thank you