

Sentiment Analysis

[illegible]

Table of Content

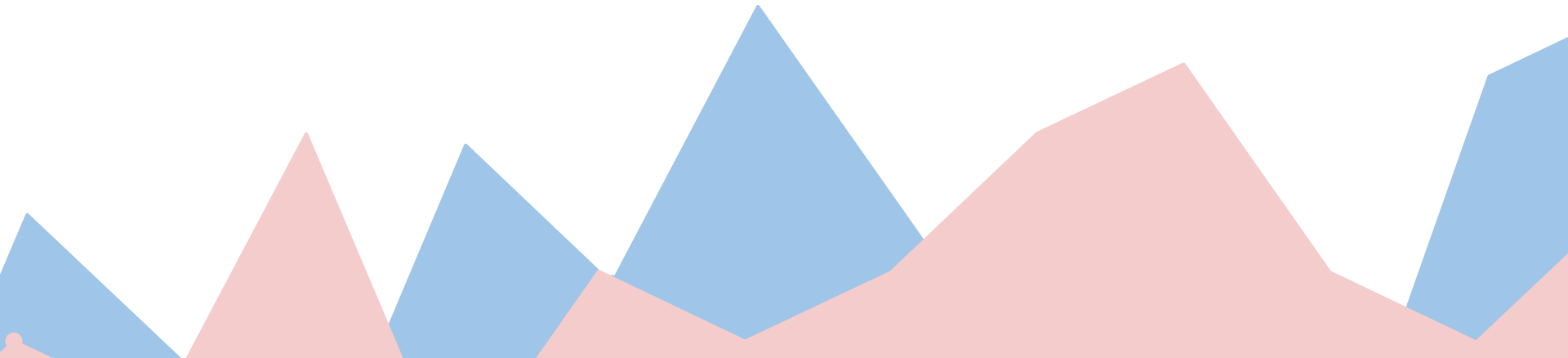
1 | Sentiment Modeling

2 | Sentiment Classification

3 | Topics identification via Machine Learning, Storytelling

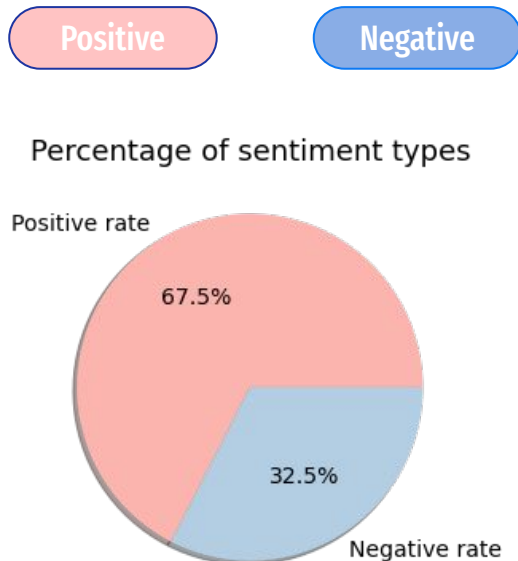
4 | Recommendation

1 | Sentiment Modeling



1 | Sentiment Modeling - Random Tweets Dataset

Ratios of labels on full dataset



WordCloud for All/Positive/Negative samples

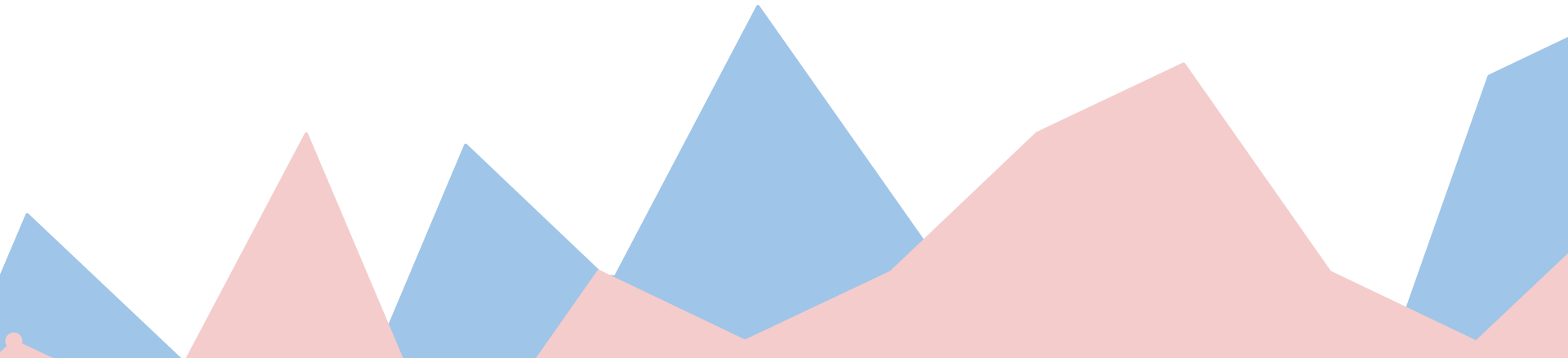


1 | Sentiment Modeling - Build 4 Model based on 70% training set

Accuracy on 70% training set and 30% test set:

Model	Training Accuracy	Test Accuracy	Hyperparameters
Logistic Regression	95.61%	95.43%	{'C': 20, 'solver': 'saga'}
Multinomial Naive Bayes	92.02%	91.92%	{'alpha': 0.01}
Support Vector Machine	95.57%	95.38%	{'C': 1}
Random Forest	99.27%	95.17%	{'n_estimators':100}

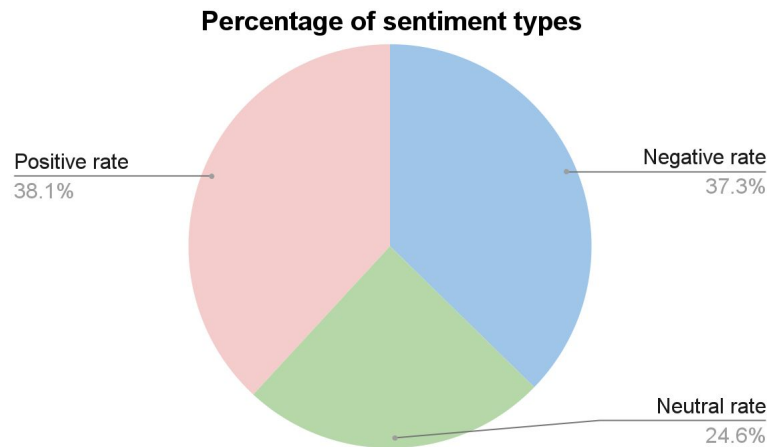
2 | Sentiment Classification



2 | Sentiment Classification - Dataset 1 (tweets related with the war, [public dataset](#))

Criteria: SentimentIntensityAnalyzer with VADER function

- Pre-trained model from Python
- VADER makes sentiment prediction based on Positivity and Negativity score
- Return us 3 Labels: **Negative/Neutral/Positive**
- Neutral sentiment are **less** informative
- We dropped neutral data points to do further analys



2 | Sentiment classification - Datasets (tweets related to the war)

Predict 2 labels only :

- Reduce test set
- only keep positive/negative samples predicted by VADER
- Evaluate the models of predicting 2 polarities on reduced test set.

Accuracy for each model, on reduced dataset 1 (public dataset):

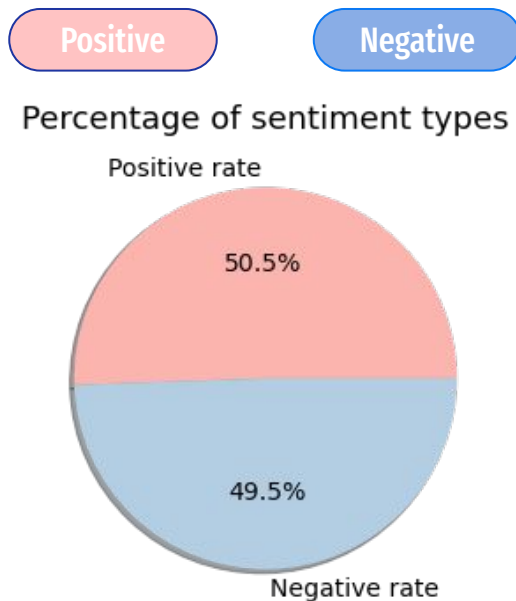
Dataset 1	Predicted Labels	Logistic Regression	Naive Bayes	SVM	Random Forest
0819_UkraineCombinedTweetsDeduped.csv	Negative/Positive	72.65%	72.33%	72.66%	69.33%

Accuracy for each model, on reduced dataset 2 (we scraped recent 20,000 tweets) :

Dataset 1	Predicted Labels	Logistic Regression	Naive Bayes	SVM	Random Forest
war_tweets.csv	Negative/Positive	84.78%	79.63%	84.45%	79.65%

2 | Sentiment classification - Dataset 1 (tweets related to the war, [public dataset](#))

Dataset 1:

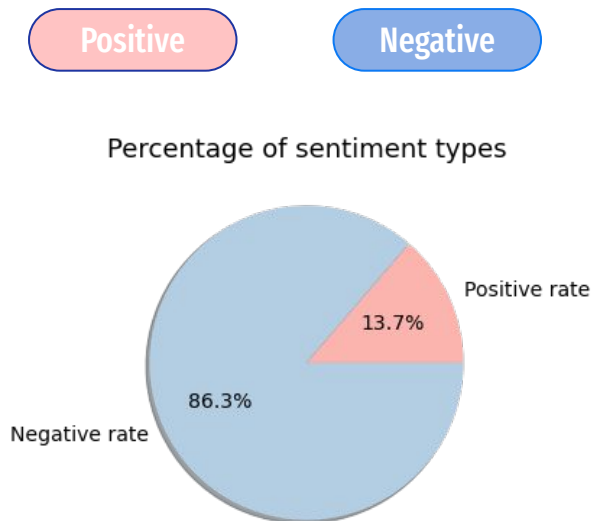


Dataset 1: All/Positive/Negative



2 | Sentiment classification - Dataset 2 (we scraped recent 20,000 tweets related to the war)

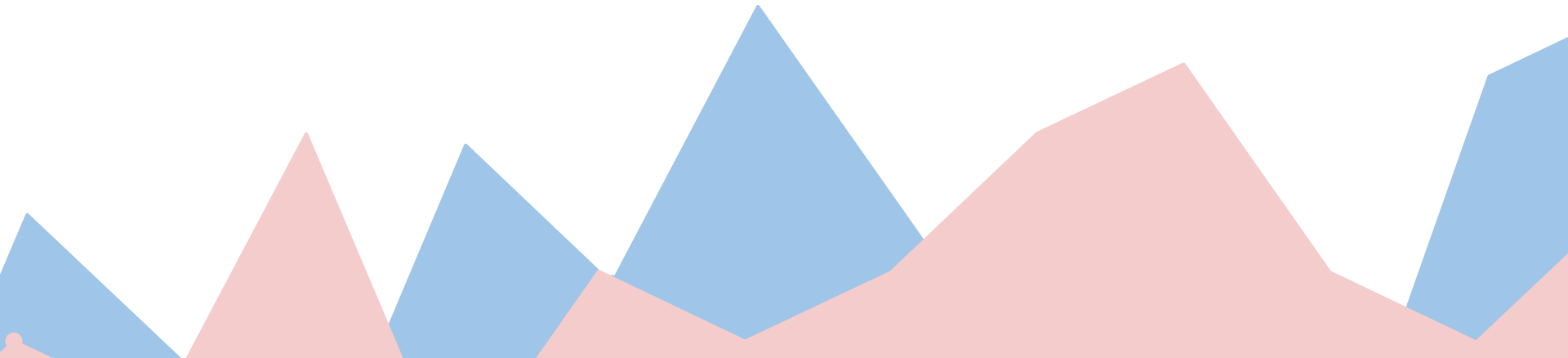
Dataset 2:



Dataset 2: All/Positive/Negative



3 | Topics identification via Machine Learning, Storytelling



3 | Topics drive Negative Sentiment

Top 25 words in Topic - Humanitarian

'mayor', 'relation', 'aircraft', 'hundred', 'wagner', 'strong', 'focus', 'humanitarian', 'politics', 'coup', 'worse', 'murder', 'buy', 'gun', 'language', 'friend', 'person', 'opinion', 'defending', 'alone', 'option', 'idea', 'paying', 'diplomatic', 'pull'

Top 25 words in Topic - Attack

'belarus', 'japan', 'ministry', 'allow', 'except', 'absolutely', 'attacking', 'listen', 'service', 'shift', 'pandemic', 'beyond', 'practice', 'answer', 'machine', 'twitter', 'following', 'shell', 'along', 'seek', 'accuses', 'led', 'begin', 'flood', 'starting'

Top 25 words in Topic - Economy, Recession

'low', 'eye', 'milley', 'simple', 'gone', 'review', 'launch', 'recession', 'diplomacy', 'armistice', 'came', 'complete', 'sense', 'pulling', 'grain', 'reach', 'zone', 'forget', 'turkey', 'yellen', 'press', 'opportunity', 'chose', 'iraq', 'pullout'

Top 25 words in Topic - Occupation, Employment

'based', 'amnesty', 'tweet', 'corruption', 'occupation', 'laundering', 'amount', 'fighter', 'street', 'finally', 'wait', 'explained', 'wonder', 'poor', 'god', 'best', 'inside', 'fake', 'town', 'responsible', 'save', 'towards', 'river', 'weak', 'israel'

Top 25 words in Topic - Freedom

'iranian', 'largely', 'brought', 'freedom', 'single', 'arent', 'attempt', 'democratic', 'role', 'worth', 'link', 'someone', 'however', 'fullscale', 'several', 'bit', 'looking', 'leaving', 'thinking', 'pro', 'congress', 'simply', 'living', 'joint', 'trap'

Top 25 words in Topic - Bomb, Rebuild

'fully', 'condemn', 'running', 'rise', 'pushed', 'early', 'suffered', 'ussr', 'directly', 'doubt', 'rebuild', 'shot', 'though', 'assistance', 'strategy', 'avoid', 'bombing', 'rather', 'flee', 'great', 'democrat', 'decision', 'else', 'chance', 'blood'

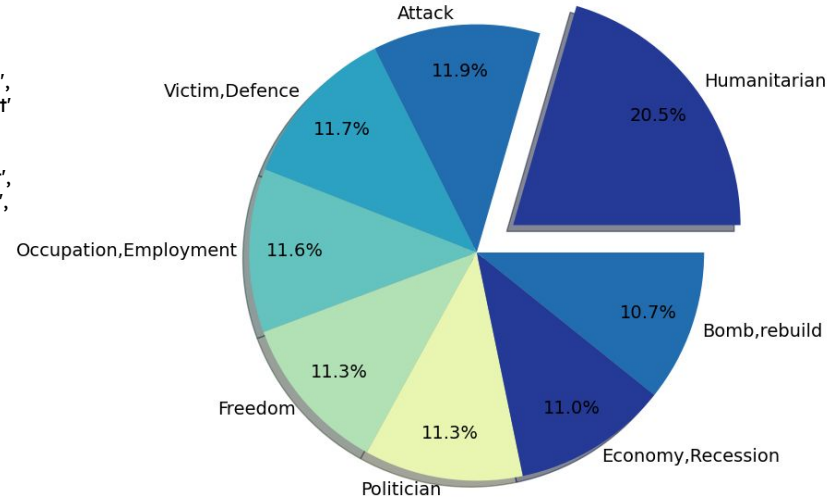
Top 25 words in Topic - Victim, Defence

'mine', 'per', 'suggests', 'loses', 'withdrawing', 'regional', 'rule', 'middle', 'prisoner', 'wage', 'geopolitical', 'shame', 'different', 'vote', 'helped', 'accountable', 'cam', 'victim', 'crazy', 'blow', 'nobody', 'helmet', 'leaf', 'defend', 'african'

Top 25 words in Topic - Politician

'empire', 'effect', 'politician', 'mass', 'preparing', 'together', 'growth', 'decade', 'sign', 'fall', 'agreement', 'shit', 'centre', 'within', 'past', 'influence', 'yeah', 'jazeera', 'indian', 'evidence', 'longer', 'supplied', 'inukraine', 'bank', 'setback'

Probability of Negative Topics



3 | Topics drive Positive Sentiment

Top 25 words in Topic - Welcome, Member

'proxy', 'ago', 'shelter', 'little', 'defeated', 'member', 'source', 'giving', 'tell', 'moscow', 'south', 'using', 'animal', 'negotiate', 'welcome', 'order', 'hit', 'lie', 'line', 'place', 'send', 'occupied', 'fund', 'done', 'lost'

Top 25 words in Topic - Supply, Agreement

'problem', 'number', 'local', 'team', 'finland', 'german', 'able', 'tax', 'arm', 'increase', 'anything', 'seems', 'withdrawal', 'away', 'bridge', 'pay', 'game', 'future', 'around', 'beautiful', 'top', 'house', 'operation', 'supply', 'agreement'

Top 25 words in Topic - Ally, Partner

'return', 'solution', 'inflation', 'policy', 'find', 'stay', 'safe', 'business', 'target', 'ally', 'partner', 'economy', 'question', 'rest', 'economic', 'recently', 'defender', 'victory', 'lol', 'something', 'latest', 'speed', 'glory', 'point', 'invaded'

Top 25 words in Topic - Huge Land

'chance', 'zelensky', 'instead', 'former', 'occupier', 'early', 'company', 'independence', 'clear', 'used', 'youre', 'post', 'history', 'everything', 'morning', 'coming', 'believe', 'situation', 'watch', 'guy', 'equipment', 'big', 'hold', 'huge', 'land'

Top 25 words in Topic - Sanction, Conflict

'assistance', 'created', 'happen', 'feel', 'major', 'check', 'took', 'information', 'amazing', 'yet', 'woman', 'word', 'taking', 'job', 'put', 'face', 'making', 'interesting', 'winter', 'democracy', 'whole', 'left', 'sanction', 'far', 'conflict'

Top 25 words in Topic - Negotiation, Group

'volodymyr', 'meet', 'tank', 'within', 'continues', 'vladimir', 'discus', 'become', 'forget', 'building', 'build', 'maybe', 'almost', 'based', 'group', 'grain', 'head', 'export', 'fighter', 'genocide', 'meeting', 'seen', 'negotiation', 'civilian', 'working'

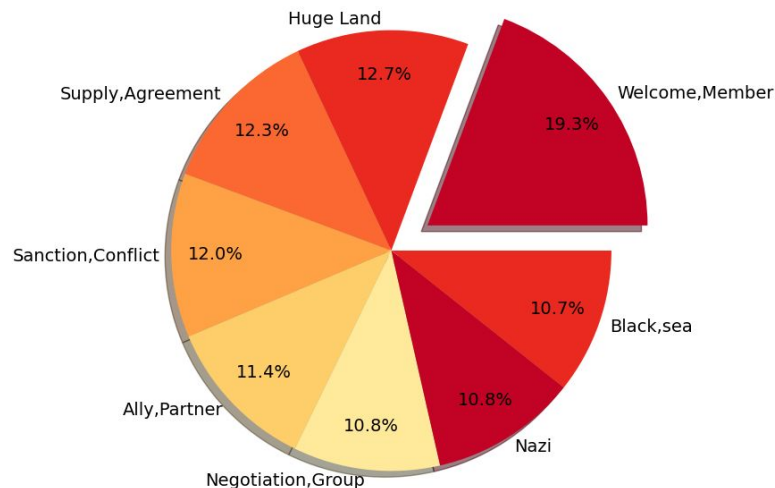
Top 25 words in Topic - Black, Sea

'material', 'involved', 'scale', 'ensure', 'allow', 'remember', 'slava', 'man', 'sea', 'fab', 'probably', 'announced', 'black', 'package', 'anyone', 'deal', 'move', 'enough', 'gain', 'iran', 'trying', 'oblast', 'fact', 'getting', 'india'

Top 25 words in Topic - Nazi

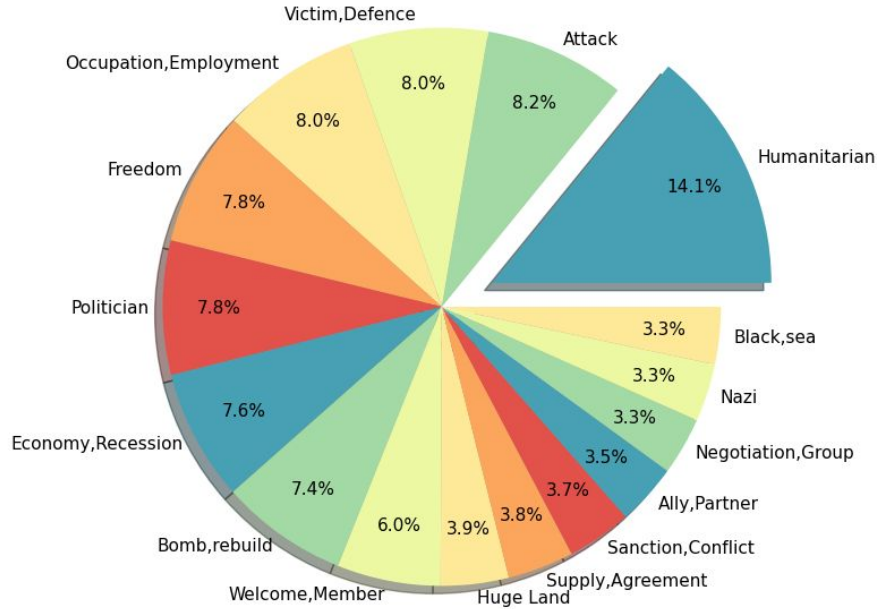
'le', 'opportunity', 'explosion', 'council', 'despite', 'nice', 'brave', 'high', 'regime', 'position', 'wouldnt', 'buy', 'cost', 'secretary', 'value', 'least', 'claim', 'provide', 'including', 'protect', 'helping', 'visit', 'general', 'uk', 'nazi'

Probability of Positive Topics



3 | All Topics

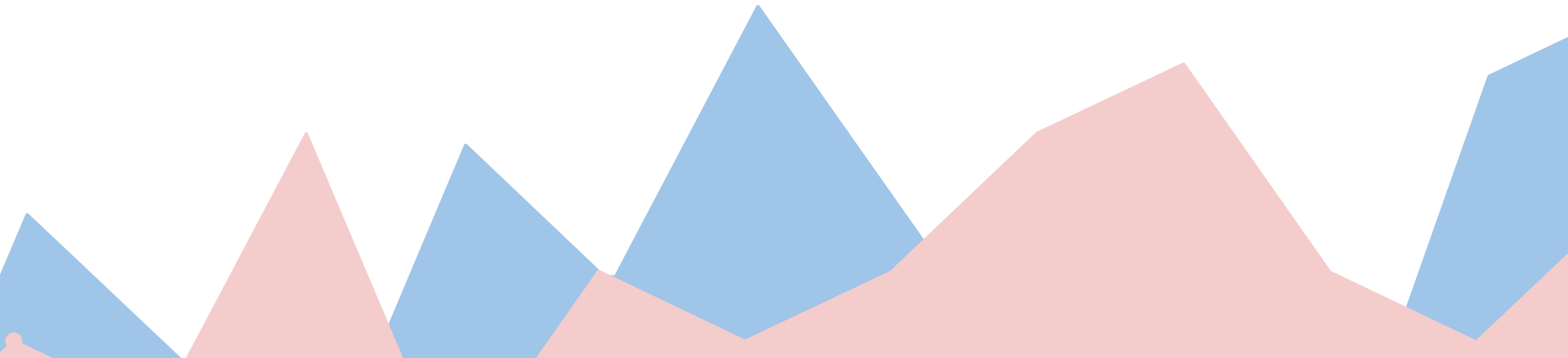
Probability of All Topics



Most common words| All topics



4 | Recommendation



4 | Recommendation

Ukraine can get more attention and the world can realize what happens in Ukraine and Ukrainians really need help



Reduce the harm of conflicts to civilians



4 | Recommendation

Show Ukraine's thanks to countries that offer help during war in the media



Provide priority protection to vulnerable groups such as women and children



4 | Recommendation

Rebuild homes and rebuild work systems



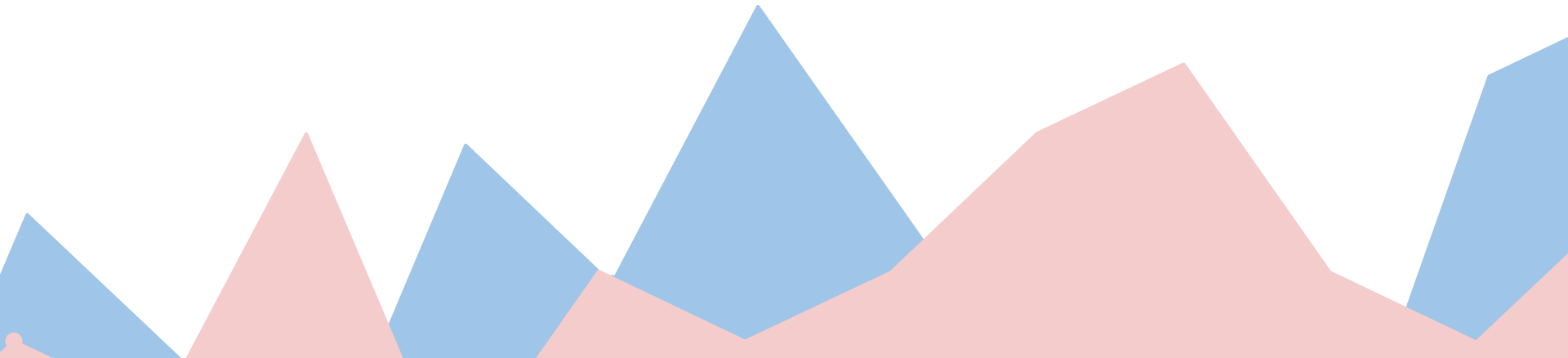
Show the world this war increases commodity prices



Increase the sense of urgency to promote diplomatic negotiations



Q & A



Reference

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Thank you !

