

MIE1624H S: Introduction to Data Science and Analytics
Group Project Report

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Introduction

The Russia-Ukraine war, which began in 2022, has attracted global attention and elicited diverse opinions. Understanding public sentiment toward the conflict is crucial for the governments, organizations, and media outlets in shaping their strategies and response to the situation. In this project, we aim to analyze public opinion on the war by conducting sentiment analysis on social media posts (Reddit) and news articles.

Sentiment analysis is a vital branch of Natural Language Processing (NLP) that enables the algorithmic determination of whether a statement is positive or negative. This helps us to gain insights into the conflict and provide recommendations to the Ukrainian government and international NGOs on strategies that could enhance Ukraine's image internationally.

This project involved sentiment modeling, sentiment classification, topic identification, and recommendations based on the analysis results.

PART 1 Sentiment modeling

1.1 Data Cleaning

The dataset being used to train the sentiment analysis models is called the “sentiment_analysis.csv”, where the sentiments in each tweet are analyzed and labelled as 0 or 1 to represent negative and positive sentiments, respectively. Since the dataset has been collected directly from the websites, it is necessary to perform data cleaning procedures to remove any emoji, URL, user tags, digits or punctuations. In addition, the unstructured nature of text data necessitates its cleaning and transformation to facilitate interpretation and comprehension by Python. Therefore, tokenization is applied to the dataset to extract singular words, and all stop words are removed as they do not add values to the analysis. Moreover, lemmatization is also applied to the dataset to reduce the word into its root form, known as the lemma. As a result, the inflected forms of a word can be combined as a single word to make text analysis easier. Finally, by using TF-IDF, the 5000 most important with the highest frequency are chosen to train the classification models.

1.2 Model selection

The dataset has been divided into training and testing sets, and four different classification algorithms have been trained on the data. Logistic regression, support vector machines (SVM), decision trees, and random forests are used to determine the most appropriate model in analyzing sentiments. Each tweet in the dataset is treated as a single observation, and the target variable is the sentiment value, either positive (1) or negative (0). We have evaluated each model's performance by using accuracy measures, F1 scores, and area under the curve (AUC) scores. Hyperparameter tuning and cross-validation have also been conducted to optimize each model's performance.

We implemented the logistic regression as our first model. After tuning hyperparameters and performing cross-validation, the optimal combination of hyperparameters occurred when C

equaled 0.1 and an L1 penalty was added. This combination resulted in an F1 score of 97.5522% and an accuracy of 96.6849%. The second model that we implemented was SVM. After hyperparameter tuning and cross-validation, the optimal setting for SVM was when C equals 0.5, which yielded an F1 score of 97.5362% and an accuracy of 96.6648%. Then, we implemented a decision tree. The optimal combination of hyperparameters obtained by hyperparameter tuning and cross-validation was selecting gini as the criterion, max_depth equals 200, and min_samples_split to be 2. This results in an F1 score of 97.5362%, and an accuracy of 94.1598%. The last model that we implemented was the random forest. After hyperparameter tuning and cross-validation, the optimal setting for the random forest was when max_depth set to 325, and this yielded an F1 score of 96.576% and an accuracy of 95.3771%.

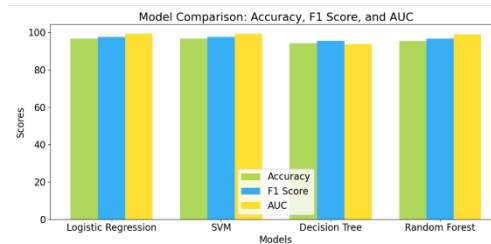


Figure 1 Model Comparison: Accuracy, F1 Score, and AUC

Figure 1 shows that both logistic regression and SVM models outperform the decision tree and random forest models in terms of accuracy and F1 scores. The performance metrics and ROC curves for each model were displayed in the Appendix. The SVM model achieves an accuracy score of 96.6648% and an F1 score of 97.5362% on the test set, while the logistic regression model scores 96.6849% in accuracy and 97.5522% in F1. Given that the target distribution is not quite balanced (369,780 positive tweets vs. 177,715 negative tweets), we consider the F1 score to be a more appropriate measure for model performance in this scenario. The F1 score takes both precision and recall into account, providing a more balanced measure of model performance. The optimized logistics model has a parameter C of 0.1, which results in the highest performance. The AUC scores for the logistics model on the training and testing sets are 0.994 and 0.993, respectively. AUC is a valuable metric for evaluating model performance, as it represents the model's ability to correctly classify instances across varying classification thresholds. The high AUC scores for the logistics model indicate strong performance in distinguishing between positive and negative sentiments. Thus, the logistics model with a parameter C of 0.1 is the most appropriate choice for sentiment analysis on this dataset. This model results in the highest accuracy, F1 score, as well as AUC value, making it suitable for effectively classifying tweets as having positive or negative sentiment. Moreover, the logistics model's high F1 score ensures that it maintains a good balance between precision and recall, which is particularly important given the imbalanced nature of the dataset.

Part 2: Sentiment Classifications

2.1 Data Collect and Cleaning

For the analysis, we used two Kaggle datasets collected from Reddit, being <https://www.kaggle.com/datasets/gpreda/russian-invasion-of-Ukraine> and <https://www.kaggle.com/datasets/diyacharya/ukraine-russia-war-reddit-data>. The first dataset contains Reddit posts from the subreddit about Russian Invasion of Ukraine collected by Gabriel Preda. The last update for the first dataset was in October 2022. The second dataset contains Reddit posts that were searched based on the keywords like Ukraine, and Nato. The last update for the second dataset was in August 2022.

We conducted data cleaning process on both datasets in a way similar to what we did for the dataset in part 1. We first removed irrelevant features such as emojis, tags, and URLs from the text since they are not useful in sentiment analysis. Then we applied tokenization to separate text into individual words, removed stop words and performed lemmatization to reduce length of the words.

2.2 Apply VADER and the tuned Logistic Model

VADER (Valence Aware Dictionary and Sentiment Reasoner) is a tool for sentiment analysis that is lexicon- and rule-based and is made to find sentiments expressed in social media. (Gilbert, May 2014.) We chose Vader since it performs well on sentiment classification of casual conversation, such as texts generated from social media platforms. VADER will generate compound score thresholds, which is between -1 (most extreme negative) and 1 (most extreme positive). The sentiment will be counted as positive if compound score is greater or equal to 0.05, or neutral sentiment if the compound score is between -0.05 and 0.05, or negative sentiment if compound score is below -0.05. By doing so, we can identify the sentiment easily. For better identification of keywords with positive and negative sentiments, we discarded the observations with neutral label, then we apply our tuned logistic model from part 1 to both datasets.

2.3 Results and Comparisons

We made comparisons on Vader and the logistic model from Part1 by using pie charts. Figure 2 and 3 demonstrates the proportion of positive, negative, and neutral predictions by Vader, along with the proportion of positive, negative predictions predicted by using Vader and the logistic model 1 observations on both datasets.

By examining the ternary output of Vader on two datasets, it can be observed that the proportion of sentiment output of these two data turned out to be quite similar. Negative sentiment observations composed of nearly half of the total postings (41%), followed by 35% of the total posting being the positive sentiment and the remaining 24% belong to the neutral posts, which should be deleted before applying the logistic model and part3 word analysis.

On the first dataset, the number of predictions of each sentiment label generated by Vader and logistic model are similar, with Vader predicting a slightly higher number of positive postings. On the second dataset, the predictions made by both models are nearly identical. Both datasets are relatively balanced, which provides us with sufficient samples for analysis of both positive and negative words in the next steps.

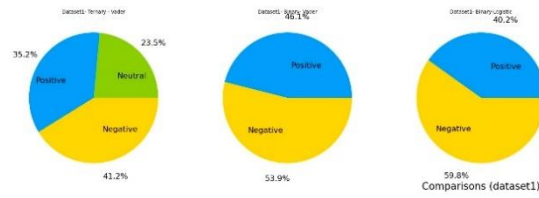


Figure 2 Pie Chart for Dataset1

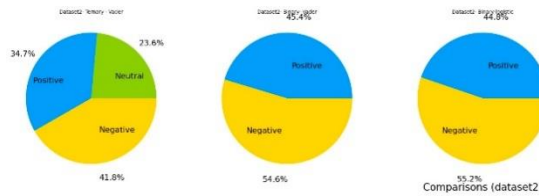


Figure 3 Pie Chart for Dataset2

PART 3: Topic Classifications

In this section, we used Non-negative Matrix Factorization (NMF) and identified the 25 top topics or factors that drive sentiment in the comments. Then, we extracted the top 10 keywords for each topic using the feature names from the TF-IDF Vectorizer and the components from the NMF model. To further analyze sentiment, we filtered the datasets into Russia and Ukraine by checking whether ‘text’ contains keywords related to each country. Additionally, we separately examined texts with positive and negative sentiment in each datasets using NMF. Then, we identified the more informative topics from 25 topics from each result and analyzed the relevant factors.

3.1 Ukraine Positive Topics

Topic 4: equipment tank send military train need ukraine number use army

Topic 4 brings positive sentiment about Ukraine. As we dig deeper into the topic, we found that according to BBC news, “the United States has dispatched 31 Abrams tanks to Ukraine, with the United Kingdom and Germany providing 14 Challenger 2 tanks and 14 Leopards 2 tanks, respectively. In addition to these contributions, Spain has pledged to send 6 Leopard 2 tanks to support Ukraine's armed forces... Ukraine's armed forces know how to operate them, and how to maintain them, and had a lot of spare parts for them.” (David Brown, 2023)¹

This significant contribution from NATO member countries reflects their unwavering commitment to safeguard Ukraine's sovereignty and territorial integrity against Russia’s aggression. The support of these tanks to Ukraine's military power further strengthens its defense capabilities. Moreover, Ukraine has demonstrated its proficiency in operating and maintaining these weapons. Hence, this support has significantly improved Ukraine's military capabilities, instilling greater confidence in the nation's capacity to triumph over the ongoing conflict and safeguard its homeland.

Topic 25: fight ukraine win surrender american volunteer army death freedom man

Topic 25 describes the positive sentiment associated with the term "volunteer" in the context of the Ukrainian crisis, and it is driven by several factors that evoke a sense of solidarity and shared commitment. CBC news reported the International Defence Legion, with over 20,000 volunteers from 52 countries, including former military personnel, medics, and ordinary citizens (Burke, 2022). This demonstrates global solidarity with the people of Ukraine and a shared commitment to defending democratic values, human rights, and international law. This volunteer movement is also inspired by the courage, determination, and resilience of Ukrainians from diverse backgrounds, who have stepped up to defend their homeland in the face of adversity (Malsin, 2022). Stories of resilience and unity emerging from the conflict generate empathy and a shared sense of responsibility by people from around the world. This further motivates individuals to offer their support to Ukraine. By standing against Russian aggression and protecting common civilizational values, the volunteers have solidified the positive sentiment surrounding their actions. Thus, the term "volunteer" has come to symbolize not only the global community's commitment to supporting Ukraine but also the strength and unity of people from various nations in the face of adversity.

3.2 Ukraine Negative topics

Topic 22: help ukraine world west destroy money way rebuild pay sure

This topic refers to the sentiment surrounding the global community's assistance to Ukraine, particularly from Western countries, in the context of the destruction caused by the conflict. This topic touches upon financial aid and the efforts to rebuild the country.

Recent estimates suggest that the cost of rebuilding Ukraine's damaged infrastructure and industrial facilities could be between \$220-540 billion. (What will it cost to rebuild Ukraine?, 2022) However, the challenges and uncertainties involved in reconstructing Ukraine after years of conflict and political upheaval are becoming increasingly clear. In addition to the enormous financial cost, there are also concerns about corruption in the country (Law, 2023). Unfortunately, the widespread corruption in Ukraine could make this process difficult to complete. The rebuilding efforts could be hampered by a lack of transparency and accountability, which could result in funds being misused or siphoned off by the corrupt officials. This could lead to delays in the reconstruction process and further exacerbate the country's economic and political challenges. Despite these obstacles, the international community has pledged its support for Ukraine's reconstruction. However, it remains to be a question of whether these efforts will be successful given the challenges and uncertainties involved.

3.3 Russia Positive topics

Topic 7: gas germany oil europe german eu buy energy price pay

This topic is a positive sentiment about Russia. In 2021, Russia was a major player in the European gas market, supplying 40% of the EU's natural gas, with Germany being the largest importer, followed by Italy and the Netherlands (Economic, financial and monetary developments, 2022). However, by August 2022, Russia's share in the EU gas supply dropped to around 17% (Economic, financial and monetary developments, 2022). Despite this reduction, Russia remains a key supplier in the energy sector due to its abundant natural resources. This dominant position in the gas supply chain has contributed to the positive

sentiment surrounding Russia in relation to the term "gas supply". This led to a significant increase in the prices of oil, coal, and gas in the EU, with an increase of approximately 40%, 130%, and 180% respectively (Economic, financial and monetary developments, 2022). This situation showcased Russia's leverage in the European energy market and demonstrated its ability to cause substantial stress to the European energy market when limiting its energy supply. Nevertheless, Russia managed to mitigate the impact on its economy by diversifying its exports and increasing its gas supply to countries like China and India.

This topic evokes positive sentiment toward Russia due to the country's vast natural resources and its strategic position as a significant energy supplier. This status allows Russia to wield considerable influence in global energy markets and maintain its economic stability even when faced with geopolitical challenges. By diversifying its export markets and adapting to changing circumstances, Russia has demonstrated its resilience and ability to maintain a strong presence in the global energy landscape.

3.4 Russia negative topics

Topic 25: kill soldier civilian innocent rape child ukrainian death dead torture

Topic 25 is a negative sentiment about Russia. The word "Civilian" has taken on a negative sentiment in the context of the Russian invasion of Ukraine due to the devastating consequences of the conflict on innocent civilians, including children. According to the New York Times, since the beginning of the invasion, at least 1,500 civilian buildings, structures, and vehicles in Ukraine have been damaged or destroyed. (Keith Collins, 2022) The conflict has resulted in the deaths of more than 953 civilians, including at least 78 children. (Keith Collins, 2022) In the region of Kharkiv, Ukraine's second-largest city, over 60 schools have been damaged due to relentless shelling (Keith Collins, 2022).

These tragic consequences underscore the immense suffering and trauma experienced by the Ukrainian population at the hands of the invading forces. The targeting of civilian infrastructure, including residential areas and schools, has drawn widespread condemnation and fueled negative sentiment towards Russia. This topic reflects the innocent victims caught in the crossfire, emphasizing the human cost of the conflict and the urgent need for its resolution. The plight of civilians in Ukraine has sparked international outrage, further deteriorating Russia's image on the global stage and amplifying calls for an end to the aggression.

PART 4: Recommendation

Based on the identified factors, we give the following recommendations.

Recommendation 1: Increase engagements with the international media

There are several ways for the Ukraine government to engage with international media to bring positive impacts on Ukraine's international image.

First, from the previous analysis, we can see how Russia is gaining positive sentiment due to their natural resources. We recommend the Ukraine government and NGO to engage with the international media to advertise Ukraine's natural resources as "Ukraine is an important

agricultural country and can meet the food needs of 600 million people. 1st place in Europe in terms of arable land area; 3rd place in the world by the area of black soil (25% of world's volume)" (Dunaief, 2022) . This helps with raising awareness of the preciousness of Ukraine's land, and it can benefit Ukraine by attracting more international support and consolidate the world's determination to protect the land.

Moreover, the word cloud of post with negative sentiment in Figure 9 shows words such as "stereotype", "racism", "troll" that might affect Ukraine in a negative way. Hence, we recommend Ukraine government to partner with social media platforms to develop and implement effective strategies for countering misinformation, hate speech, and other harmful content related to the war in Ukraine. The Ukraine government and NGOs should work together to raise awareness about the dangers of online hate speech and the role it can play in exacerbating conflicts and divisions. The government can also collaborate with media outlets and influencers to create and share positive, uplifting content that showcases the resilience, strength, and unity of the Ukrainian people in the face of adversity.

Finally, the government can join the NGOS and human right organizations to document and reveal war crimes and human rights abuses occurring during the conflict. This action will also demonstrate Ukraine's commitment to upholding human rights.

Recommendation 2: Humanitarian aid coordination:

We propose the establishment of a central humanitarian aid coordination body within Ukraine. This body will collaborate closely with their international partners to assess the needs of affected populations, coordinate aid delivery, and ensure efficient and effective distribution. In the context of the effectiveness of building this agent, enhancing transparency in the management and allocation of resources is vital. By adopting transparent procurement processes, monitoring systems, and financial reporting, Ukraine can build trust with donors and the international community. This will encourage more countries and organizations to contribute to the humanitarian efforts in Ukraine, ultimately benefiting the innocent civilians and soldiers' families.

To further enhance its image and reduce the suffering of its people, Ukraine must implement policies that address both the immediate needs of the affected population and foster long-term recovery and resilience. First, Ukraine should invest in the capacity building of local organizations and community leaders. By doing this, they can take ownership of the humanitarian response and tailor it to the unique needs of their communities. This will not only result in more efficient and targeted assistance but also foster a sense of solidarity and unity among the population. Second, it is crucial to address the psychological and emotional well-being of those affected by the conflict. Ukraine should collaborate with mental health professionals and NGOs to provide counseling and support services for individuals suffering from trauma, grief, and other mental health issues. Additionally, implementing programs aimed at fostering social cohesion, such as cultural events and community-based projects, can help rebuild a sense of belonging and shared identity among the population.

Furthermore, Ukraine should also work on promoting economic recovery and creating sustainable livelihoods for its people. This includes supporting small businesses, investing in infrastructure projects, and providing vocational training and education opportunities, especially for displaced individuals and those affected by the conflict. By doing so, Ukraine can not only alleviate the immediate suffering of its people but also create a foundation for long-term growth and prosperity. By adopting these measures, Ukraine can effectively reduce the pain and suffering of its people, while also promoting a positive image both domestically and internationally. This will, in turn, attract more support and assistance from the global community, fostering a virtuous cycle of recovery and development.

Recommendation 3: Strengthen diplomatic efforts

From the previous factor analysis, we learned that military support from NATO brings positive sentiment towards Ukraine. Hence, we want to recommend the Ukraine government to strengthen diplomatic ties with its allies and NATO. By fostering strong relationships with like-minded nations, Ukraine can receive not only military, political, but also economic support to counter Russian aggression and protect its sovereignty. This support can act as diplomatic backing for Ukraine, where allies can voice their condemnation of Russia's actions and advocate for sanctions. Moreover, with the economic help from the allies, Ukraine may recover from the conflict faster. To strengthen NATO partnerships, for example, Ukraine can actively participate in joint military exercises with NATO member countries, and this will demonstrate Ukraine's military capabilities, interoperability, and commitment to the alliance. These exercises will not only enhance Ukraine's defense capabilities but also help build trust and rapport with the NATO member countries. By demonstrating commitment to diplomacy will also enhance Ukraine's global image and attract further backing. Moreover, the professional skills and capabilities of the Ukrainian Armed Forces can also be improved. In addition, the Ukraine government should also work to ensure that any military support that they received is carefully calibrated and should be transparent so that they can possibly avoid bringing the conflict to the next level or provoke a larger confrontation. Finally, engaging in diplomatic efforts and urge for a peaceful resolution to the conflict is essential. By demonstrating its commitment to peace and stability, Ukraine can receive more international support and create an environment conducive to rebuilding and healing.

PART 5: Conclusion

Upon conducting sentiment analysis of the social media posts about the Russia-Ukraine war, we notice that Ukraine receives positive sentiments on its unity and determination in fighting for the country. On the other hand, Ukraine receives some negative sentiments towards the postwar reconstructions. We believe that Ukraine is staying in a favorable public opinion environment. We believe that the Ukraine government and NGO should consider our recommendations and make changes in their current portfolio of strategies accordingly to enhance Ukraine's international presence and image.

Appendix

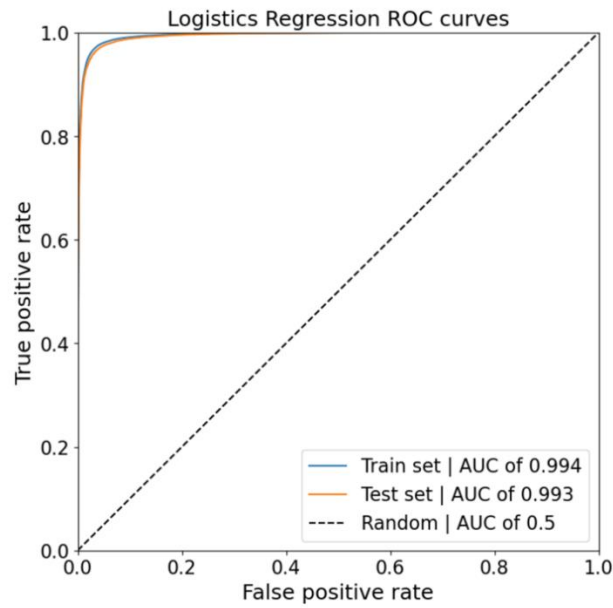


Figure 4 Logistics Regression ROC curves

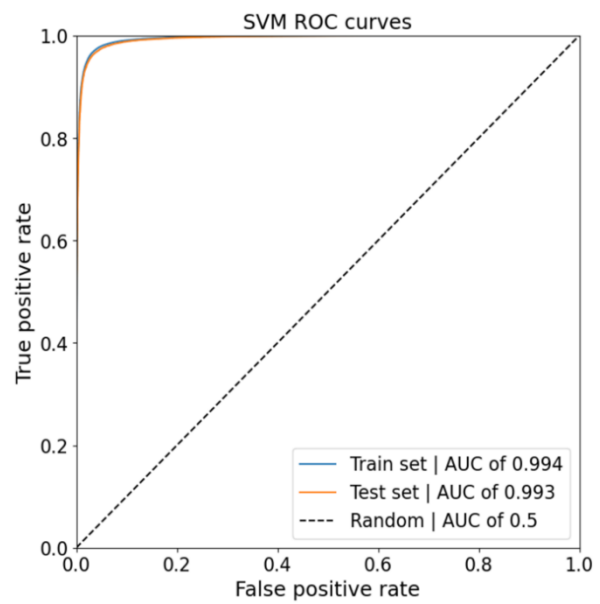


Figure 5 SVM ROC curves

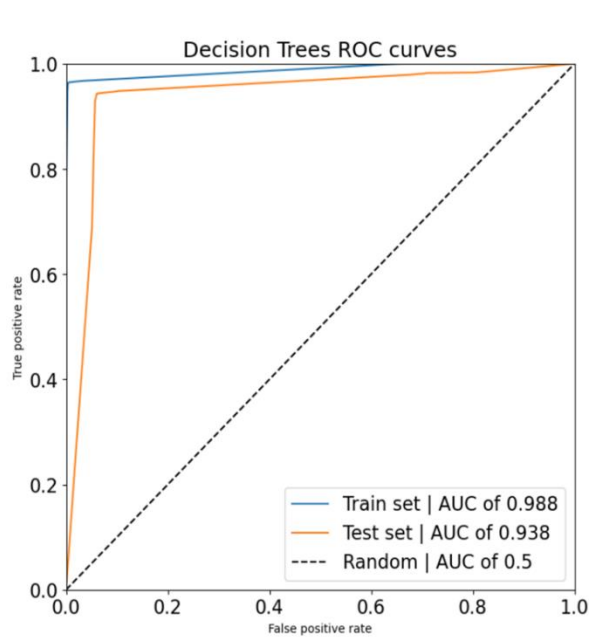


Figure 6 Decision Trees ROC curves

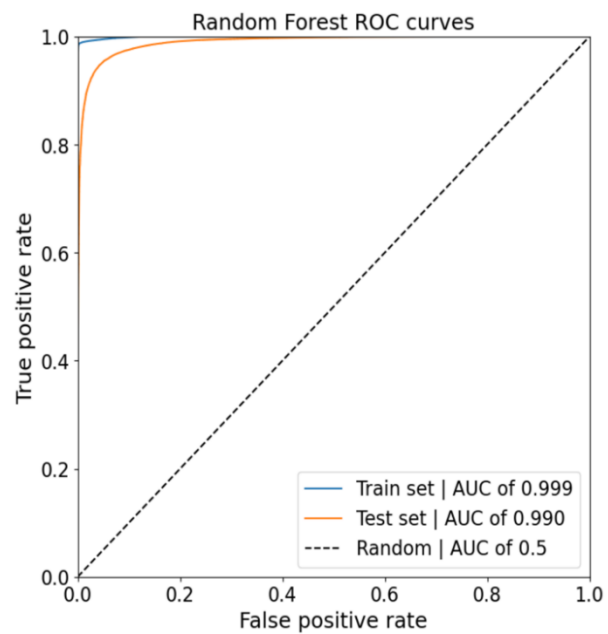


Figure 7 Random Forest ROC curves



The Negative Sentiment word cloud



Figure 9 The negative sentiment word cloud

Topic	Top 10 Key Words
Topic #1:	nitter compose ukrainianconflict moderator automatically alternative subreddit contact perform link
Topic #2:	russia ukraine lose military territory china invasion invade win west
Topic #3:	ukrainian great yes use army life land thank intelligence kind
Topic #4:	equipment tank send military train need ukraine number use army
Topic #5:	germany german gas poland send government deliver france scholz promise
Topic #6:	nato join member finland turkey air sweden ukraine conflict attack
Topic #7:	think ukraine really agree crimea win way yeah come wrong
Topic #8:	war crime win ukraine lose commit end start west long
Topic #9:	russian army propaganda speak territory invasion pro language destroy loss
Topic #10:	nuke nuclear use tactical power threat attack launch west plant
Topic #11:	putin trump president invade ukraine fuck try world stop win
Topic #12:	country eu help europe need ukraine money world year european
Topic #13:	support ukraine trump republican biden aid american mean president military
Topic #14:	quot feedback tl welcome summary faq monitor comment pm drs
Topic #15:	missile range air himar target km anti artillery ship hit
Topic #16:	people nazi million genocide lot live world understand fuck care
Topic #17:	like look sound really nazi feel shit government act state
Topic #18:	force kherson troop attack line area city offensive artillery supply
Topic #19:	day ukraine loss ago report lose himar number year casualty
Topic #20:	want land ukraine really leave die peace happen territory need
Topic #21:	weapon ukraine heavy send supply nuclear western ammo provide hand
Topic #22:	know say make good bad thing guy right sure happen
Topic #23:	soldier kill civilian dead surrender wound pow train die death
Topic #24:	remove post hi submission site source unreliable identify comment subreddit
Topic #25:	fight ukraine win surrender american volunteer army death freedom man

Figure 10 Ukraine Positive Topics

Topic	Top 10 Key Words
Topic #1:	policy moderator comment bigotry violator rulebreake server slogan stereotype meme
Topic #2:	ukraine leave hope like yeah invade free crimea sure yes
Topic #3:	russian soldier kill troop pro propaganda territory army civilian invasion
Topic #4:	submission remove follow discussion dmy writing issue reason emotive foster
Topic #5:	russia invade nuke attack china nuclear country use territory west
Topic #6:	nato nuke join member attack country border troop membership ukraine
Topic #7:	weapon use nuclear ukraine supply heavy provide western west deliver
Topic #8:	war end start crime world military proxy ukraine declare lose
Topic #9:	ukrainian hope soldier kill pow die civilian like look leave
Topic #10:	missile save stop rocket ukraine range snd hit life cruise
Topic #11:	putin trump invade stop nuke west end power invasion plan
Topic #12:	force air attack artillery line kherson supply troop military border
Topic #13:	say thing article believe attack lie video word blame nazi
Topic #14:	join eu ukraine serbia hungary penalty referendum army mean finland
Topic #15:	want crimea peace land end destroy country world bridge sell
Topic #16:	fight stop soldier army troop west home conscript man country
Topic #17:	need stop long peace land soldier ukraine train jet artillery
Topic #18:	good army world luck second bad news thing nd job
Topic #19:	send die troop ukraine tank train date title soldier money
Topic #20:	germany country german tank gas france europe poland provide money
Topic #21:	win lose ukraine hope victory think donbas let land gain
Topic #22:	help ukraine world west destroy money way rebuild pay sure
Topic #23:	fuck shit fucking world slava believe ukraine ruzzia biden man
Topic #24:	people make know think right way really lot look point
Topic #25:	support west ukraine republican trump aid fully majority party china

Figure 11 Ukraine Negative Topics

Topic	Top 10 Key Words
Topic #1:	russia state terrorist fail happen try great collapse year sanction
Topic #2:	putin trump blame suck man dick try bitch shit power
Topic #3:	russian propaganda news pro video post speak state try shit
Topic #4:	equipment troop force army lose line soldier time day tank
Topic #5:	nuclear weapon power threat use plant tactical strike arsenal threaten
Topic #6:	war crime win start end lose declare fight cold commit
Topic #7:	gas germany oil europe german eu buy energy price pay
Topic #8:	nato attack join finland member turkey sweden force air alliance
Topic #9:	think really come way point care actually win stupid wrong
Topic #10:	ukraine crimea win territory help weapon west invade invasion land
Topic #11:	ukrainian kill civilian russian soldier force territory fight city language
Topic #12:	people kill government nazi lot million believe life power live
Topic #13:	country eu world european western invade live europe leave right
Topic #14:	like look sound shit feel stuff time kind fucking guy
Topic #15:	want land really happen world live fight let maybe peace
Topic #16:	fuck shit fucking president let america oh ya bet life
Topic #17:	china india taiwan world chinese oil sanction korea west buy
Topic #18:	nuke use tactical launch world threaten mad work mean end
Topic #19:	missile air range artillery himar target use hit ship tank
Topic #20:	military target civilian equipment operation intelligence aid use corruption western
Topic #21:	say trump quot president comment tl feedback far source attack
Topic #22:	bad good guy thing nazi news look idea feel really
Topic #23:	know happen right actually let lie year sure come maybe
Topic #24:	make sense sure way try decision right thing mistake look
Topic #25:	support trump right west republican party government invasion vote american

Figure 12 Russia Positive Topics

Topic	Top 10 Key Words
Topic #1:	russia leave threat bad shit invade mean right yes yeah
Topic #2:	fuck warship shit troll fucking cunt really russia shut slava
Topic #3:	russian propaganda soldier army leave dead pro shit troll bad
Topic #4:	putin trump die love care dead bitch shit hope yeah
Topic #5:	ukraine invade support crimea territory west fight help push win
Topic #6:	war start end crime proxy fight declare criminal cold win
Topic #7:	nato join attack finland border threat member country eu sweden
Topic #8:	like look sound feel act trump thing really play guy
Topic #9:	want really live end land business west way fight die
Topic #10:	force ukrainian military troop time attack artillery air line target
Topic #11:	say thing lie believe tell guy right day article true
Topic #12:	nuke use launch tactical threaten west nuclear threat response work
Topic #13:	good thing way army job bad luck look news work
Topic #14:	lose win time badly really tank territory loss month crimea
Topic #15:	people die care hate support lot believe million government hope
Topic #16:	need send really west understand point europe tank win defeat
Topic #17:	destroy bridge himar tank crimea target sea black infrastructure city
Topic #18:	country germany gas oil time europe german buy year sanction
Topic #19:	think know really hope way let come actually happen thing
Topic #20:	make sense sure look point clear mistake decision money try
Topic #21:	world rest free live entire place nation military power end
Topic #22:	china west india support taiwan sanction trade korea way help
Topic #23:	stop missile happen way bomb send rocket snd buy read
Topic #24:	weapon nuclear use send supply strike threat chemical provide plant
Topic #25:	kill soldier civilian innocent rape child ukrainian death dead torture

Figure 13 Russia Negative Topics

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