Social media sentiments and public discourse on Iran's territorial claims over the Three Islands

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Article Info	Abstract
	This study examines the resurgence of public discourse surrounding Iran's territorial claims over the islands of Greater Tunb, Lesser Tunb, and Abu Musa in the Persian Gulf. Iran claims historical and legal sovereignty, while the United Arab Emirates, supported by the Persian Gulf Cooperation Council and the European Union, calls for international arbitration or negotiated resolution. Triggered by a joint statement from the European Union and Persian Gulf Cooperation Council in October 2024, this research utilized 3,127 unique Persian-language posts from X to analyze public sentiment and thematic trends. A combination of natural language processing tools, including sentiment analysis and clustering techniques, revealed nuanced emotional and thematic patterns. Key findings include balanced sentiment distributions and eight distinct thematic clusters, highlighting discussions on historical claims, critiques of foreign interventions, and geopolitical tensions. Innovative visualizations, such as sentiment-based keyword clouds and heatmaps, elucidate the complexities of public reactions. This analysis reveals the intertwined narratives of sovereignty, identity, and geopolitics in shaping Iranian public opinion, that will have immense effect on political forces that try to shape global perceptions about the issue of The Triple Islands. Our analysis bridges gaps in digital nationalism studies by providing the first empirical NLP examination of post-2024 reactions, revealing how online narratives reinforce identity amid isolation.

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1. Introduction

The issue of territorial sovereignty over the islands of Greater Tunb, Lesser Tunb, and Abu Musa has long been a point of contention in the geopolitics of the Persian Gulf. These islands, situated at a strategic maritime crossroads, have sparked disputes between Iran and neighboring Persian Gulf states, particularly the United Arab Emirates (Sagheb et al., 2025). Historically, Iran asserts its sovereignty over these islands based on centuries of historical and administrative precedence.

The significance of these islands extends beyond their historical and symbolic value. As choke points in the Persian Gulf, they hold immense strategic importance, particularly regarding the control of the Strait of Hormuz. This strait is a vital maritime passage through which a significant portion of the world's oil supply transits. Iran's control over the islands enables it to exert substantial influence over this corridor, which has far-reaching implications for global energy security and geopolitics (Cordesman & Al-Rodhan, 2006). Thus, any international discourse challenging Iran's sovereignty over these islands not only provokes nationalist sentiment but also raises concerns about potential shifts in regional power dynamics.

Iran's weakened position in the international community has made the country vulnerable (Farzanegan, 2026) and therefore Iranian general public has become more sensitive by territorial claims by neighboring countries. The matter of three islands regained international prominence following a joint statement issued by the European Union and the Gulf Cooperation Council on October 16, 2024, calling for an end to what they described as Iran's "occupation" of the islands. This statement catalyzed a renewed wave of public discourse and social media engagement, particularly on platforms frequented by Persian-speaking users.

Social media has become an indispensable tool for gauging public opinion and understanding the nuances of political discourse in modern times (Sabbar & Matheson, 2019; Shahghasemi et al., 2025). Platforms such as X allow users to share their perspectives in real time, creating a vast repository of sentiments, opinions, and narratives. In this context, examining the public sentiment surrounding Iran's sovereignty over these islands provides a unique window into the collective psyche of Iranian citizens. Such analyses also highlight how narratives of national identity, historical claims, and responses to foreign interventions intertwine in the digital space (Hussain & Howard, 2013; Shahghasemi & Prosser, 2019).

The resurgence of this issue on social media revealed the changing landscape of political engagement. Social media platforms have emerged as both arenas for public debate and tools for geopolitical strategy. They serve as venues where individuals, groups, and even state actors propagate narratives, challenge opposing views, and shape public

opinion (Morozov, 2012). The joint statement by the European Union and the Gulf Cooperation Council did not remain confined to diplomatic corridors; it reverberated across social media, amplifying debates on historical legitimacy, international law, and geopolitical power plays that is something inseparable from the political life in the Middle East (*see for example,* Howard et al., 2011).

The current study uses a dataset of 3,127 Persian-language posts from Platform X, collected between October 16 and October 21, 2024, to analyze public discourse on this topic. This dataset was carefully curated, with preprocessing steps ensuring that only unique, text-based posts were analyzed, thereby excluding duplicate and non-informative entries. Current scholarship on the Triple Islands focuses on geopolitics (*e.g.,* Al Nahyan, 2013: 45; Buderi & Ricart, 2018: 102), but neglects digital sentiment, with no studies analyzing Persian X discourse post-2024 EU-GCC statement (confirmed via comprehensive review; e.g., no NLP applications in Asadian, 2023). This research represents the first and only academic study to systematically analyze social media users' responses to the "Three Islands" crisis. The study captures how ordinary users engage with geopolitical discourse, offering a novel digital perspective on a longstanding territorial dispute that has previously been explored only through political and legal analyses. Using advanced natural language processing techniques, including sentiment analysis and clustering, the study identifies key themes and emotional patterns in the discourse. This approach not only sheds light on public sentiment but also reveals how individuals and groups construct and propagate narratives around the islands' sovereignty. Next section is a review on Iranian nationalism and the issue of Triple Island. In the methodology section, we will provide information about our method and procedure. We have added a whole section to review previous studies; this shows how the existing huge body of literature on this subject largely failed to study grassroots discourse on the triple islands. The research will then continue to Findings and Conclusion sections.

2. Iranian nationalism and the Triple Islands

Iran, with its rich historical heritage, has been a complex example of nationalism, where diverse elements converge to forge a distinctive national identity (Asadian, 2023). This nationalism significantly influences Iran's approach to foreign policy, particularly concerning territorial disputes like the one involving the three islands of Abu Musa, Greater Tunb, and Lesser Tunb (ibid).

The development of Iranian nationalism can be traced back to the late Qajar era, marked by the introduction of various political, social, and cultural practices (Marashi, 2008). Seyyed Javad Tabatabai, a prominent Iranian theoretician and historian, viewed Iran as a conceptual construct deeply embedded in history, attributing its

continuous existence to "Iranian political thought". He posited that civilizations within "Iranzamin" were founded on "Iranshahr Thought" highlighting the importance of balance among religion, myths, and politics. According to Tabatabai, this political thought endured even after the arrival of Islam, preserving Iran's distinct cultural identity. Tabatabai's ideas have significantly influenced many contemporary Iranian nationalists (Tabatabai, 2015).

However, some critiques argue that Western Orientalist narratives have also profoundly shaped Iranians' awareness of their national identity (Vaziri, 1993). Edward Said's concept of Orientalism describes the Western construction of the "Orient" as a homogenous and exotic "Other", perpetuated through colonial ideologies and cultural representations (Said, 1978: 119). Mostafa Vaziri argues that Iranian national identity is shaped by a "racist" paradigm of Orientalism He contends that even the term "Iran" has been distorted by nationalist orientalists, representing a twentieth-century construct lacking historical authenticity (Vaziri, 1993). Reza Zia-Ebrahimi introduces the concept of "dislocative nationalism", where Iranians are portrayed based on historical connections to ancestral groups like the mythical Aryans, rather than their present-day identity. This concept suggests that orientalist historiography has effectively "dislocated" Iranians from their current reality (Zia-Ebrahimi, 2016: 2-3):

> It is an ideology predicated on a number of core ideas. First, Iran is a primordial nation that has been in uninterrupted existence for 2,500 years (although this fi gure is often infl ated to 5,000 and even more). Second, Iran's essence and glory is to be found in its pre-Islamic golden age. Third, Iran's shortcomings and decadence must be blamed on Islam, which Arabs imposed upon Iranians at the point of the sword. And fourth, Iranians are part of the Aryan race, thus akin to Europeans and racially quite distinct from Arabs.

Modernization and industrialization have also played a crucial role in shaping Iranian nationalism (Gellner, 1983; Marashi, 2008). Ernest Gellner asserts that industrialization promotes nationalism by requiring a mobile, literate, and culturally standardized population (Gellner, 1983). Afshin Marashi examines how elements like print capitalism, state-sponsored monuments, and commemorative rituals contributed to modern Iranian nationalism. He argues that Iranian nationalism can be traced to the late Qajar era (Marashi, 2008). Ali M. Ansari places nationalist ideologies within their historical context, tracking nationalist ideas from the Qajar dynasty to the present-day Islamic Republic. He argues that Iranians embraced the Aryan myth and established a symbolic connection with Europe, viewing themselves as a burgeoning center of civilization (Ansari, 2012).

Iranian rulers have also manipulated traditions, monuments, and practices to consolidate power and legitimacy (Adib-Moghaddam, 2017; Cronin, 2003). Arshin Adib-Moghaddam emphasizes the role of the modern state in fostering nationalist sentiment through "social engineering", where political leaders use state institutions to influence public perceptions of the past and cultivate loyalty to the nation (Adib-Moghaddam, 2017). During the Pahlavi era, ancient Iranian cultural artifacts were strategically employed to establish lasting legitimacy for the Shah (Cronin, 2003). The Islamic Republic has also utilized crafted traditions and manipulated national identity to reinforce its legitimacy, integrating religious observances into the Iranian calendar (Asadian, 2023).

The pursuit of self-determination has been another central force in shaping Iranian identity (Kashani-Sabet, 1999; Ronen, 1979). Iran maintains that the islands have always been an integral part of its sovereign territory, asserting that it has never relinquished ownership (Asadian, 2023). This stance is deeply embedded in the Iranian psyche, uniting people across political divides. The islands have been under Tehran's control since 1971, following the British withdrawal from the Persian Gulf (Al Nahyan, 2013).

However, the UAE claims that the islands were under the jurisdiction of the Qasimi sheikhs throughout the 19th century, with these rights passing to the UAE in 1971 (Al Nahyan, 2013). The islands came under British administration in 1921, but on November 30, 1971, Iran's then-monarch, Mohammad Reza Shah, ordered the Iranian navy to seize control of all three islands. Iranian military forces have been stationed on the islands ever since (ibid). Iran's foreign policy regarding the islands is driven by a strong sense of national pride and a determination to protect its territorial integrity. The islands are seen as an inseparable part of Iran, and any challenge to its sovereignty is met with fierce resistance.

The three islands hold significant strategic importance due to their location near the Strait of Hormuz (Yazdani & Yanzhe, 2022). The Strait of Hormuz is a vital shipping lane for global oil supplies, and control over the islands allows Iran to monitor and potentially control maritime traffic in the area. This strategic advantage is a key factor in Iran's determination to maintain its control over the islands. During the Iran-Iraq War (1980-88), the Islamic Revolutionary Guard Corps (IRGC) used Abu Musa to launch attacks during the "Tanker War" (1984-88) (Al Nahyan, 2013). The islands' location enables Iran to project power and influence in the region (Yazdani & Yanzhe, 2022).

The dispute over the three islands has complicated Iran-UAE relations and has drawn in other international actors (Buderi & Ricart, 2018). The UAE has consistently protested Iran's *occupation* of the islands and has called for a resolution through direct negotiations, arbitration, or the International Court of Justice (ICJ) (ibid). In recent

years, the UAE has gained support from key international players, including the United States, Russia, and China, for its claims to the islands. This has left Iran feeling increasingly isolated on the international stage regarding the issue (Al Nahyan, 2013).

3. Review of literature

As we mentioned earlier, alghout many academic papers, books, case studies, etc. have already studied the issue of three islands from legal, historical and territorial perspectives, no study has yet studied this issue as seen from the social media users's perspectives. There are, however, few studies that have studied this issue as related to global or local discourses.

Al-Alkim examined the longstanding territorial dispute between the United Arab Emirates (UAE) and Iran over the islands of Abu Musa, Greater Tunb, and Lesser Tunb, framing it within the broader geopolitical dynamics of the Persian Gulf. Tracing the roots of the crisis to the late nineteenth century, the chapter detailed how tensions culminated in Iran's seizure of the islands on November 30, 1971, just prior to the UAE's independence. Al-Alkim argued that Iran's continued occupation and refusal to submit the dispute to international mediation or arbitration reflected Tehran's broader ambition to assert dominance in the Persian Gulf subregion. The analysis underscored how this stance complicated diplomatic rapprochement between Iran and the UAE and remained a persistent source of friction within Persian Gulf regional politics. Despite improved relations between Iran and the Gulf Cooperation Council (GCC) during President Khatami's tenure, the 2000 GCC summit in Bahrain reaffirmed the UAE's sovereignty claims and disbanded its mediation committee, a move that elicited a strongly negative reaction from Tehran. Al-Alkim concluded that the islands issue symbolizes deeper structural tensions in Persian Gulf security politics, where national sovereignty claims intersect with regional balance-of-power considerations. The chapter provided an Arabian perspective emphasizing the dispute's implications for GCC unity, regional stability, and the prospects for cooperative security in the Persian Gulf (Al-Alkim, 2002).

Yazdani and Yanzhe (2022) examined the geopolitical and geostrategic significance of Iran's islands in the Persian Gulf, emphasizing their critical role in national security and regional influence. The study highlighted Iran's advantageous geographic position along the northern Persian Gulf, noting that the country possesses the longest coastline and numerous strategic islands—over 30 in total—stretching toward the Strait of Hormuz. These islands were analyzed for their geopolitical, geostrategic, and geoeconomic functions, which collectively underpin Iran's capacity to exert influence in domestic, regional, and global arenas. The authors underscored that several islands, notably Greater Tunb, Lesser Tunb, and Abu Musa,

hold exceptional military importance, serving as key assets in maintaining Iran's territorial integrity and defense posture. By situating the discussion within the broader context of Middle Eastern maritime politics, the paper argued that control over these islands enhances Iran's ability to regulate maritime navigation and energy transport through the Strait of Hormuz.

Rossi explored the enduring sovereignty dispute between Iran and the United Arab Emirates over the three islands, analyzing the complexities of applying international legal principles to territorial claims. The study focused on the concept of the "critical date"— the temporal point used in international law to determine the validity of competing assertions of sovereignty— and examined its theoretical and practical implications in territorial adjudication. Rossi traced the ontological development of the critical date doctrine, assessing its role in shaping decision-making processes amid historical ambiguities, colonial legacies, and divergent national narratives. The article argued that the rigid application of the critical date, coupled with international law's reliance on *effectivités* (acts of state authority), often obscures the nuanced realities of long-standing disputes, particularly in regions like the Strait of Hormuz where strategic, political, and historical factors intersect. By interrogating the assumptions underpinning liberal internationalism's pursuit of legal finality, Rossi highlighted the inherent tensions in efforts to "let bygones be bygones" through juridical closure. The paper concluded that the Persian island dispute exemplifies the limits of existing legal frameworks in reconciling historical contestation with modern international order, underscoring the need for more contextually sensitive approaches to sovereignty determination (Rossi, 2024).

While scholars like Marashi (2008) and Ansari (2012) map nationalism's historical contours, and Morozov (2012) critiques digital geopolitics, a lacuna persists: no empirical NLP studies dissect real-time Persian social media reactions to the Triple Islands amid 2024 escalations (*e.g.,* absent in Buderi & Ricart, 2018). As we mentioned earlier, this paper fills this void through cluster-validated sentiment mapping.

4. Methodology
The territorial dispute over Iran's three islands—Greater Tunb, Lesser Tunb, and Abu Musa—re-emerged as a focal point in international discourse following a joint statement issued by the European Union and the Gulf Cooperation Council on October 16, 2024, calling for an end to what they described as Iran's "occupation" of the islands. This declaration reignited debates across diplomatic, media, and digital spaces, sparking widespread reactions among Persian-speaking users on social media platforms, particularly on X. While initial responses appeared immediately after the joint statement, the most significant

wave of public engagement occurred between October 17 and October 21, 2024. To examine these reactions systematically, this study utilized Platform X's API to collect user-generated content related to the islands' sovereignty dispute. The data encompassed not only responses to the EU–GCC statement but also broader discussions on the islands' historical background, Iran's regional policies, and the geopolitical ramifications of external involvement. Using authenticated access via an API key and custom Python scripts, a comprehensive dataset of 4,000 Persian-language posts was collected without filtering for engagement metrics such as likes or reposts. Each entry included key metadata— such as user handle, content, repost count, and publication date— stored in a structured CSV file to ensure consistency and traceability throughout subsequent stages of analysis.

To prepare the data for computational processing, an extensive preprocessing pipeline was implemented to ensure analytical precision and linguistic accuracy. Multiple Python libraries were employed, including *pandas* for data management, *re* for text normalization, and *hazm* and *stopwordsiso* for Persian-specific tokenization and stopword removal. The cleaning process involved removing URLs, usernames, English words, numbers, and special characters while standardizing text through normalization, lowercasing, and tokenization. The resulting dataset focused exclusively on meaningful linguistic content relevant to public discourse. Duplicate detection algorithms were subsequently applied to eliminate redundant entries and bot-generated posts, retaining only the first instance of each unique post for integrity. This rigorous data refinement reduced the corpus to 3,127 distinct entries, ensuring that the dataset accurately represented authentic user perspectives.

5. Findings
Research findings began to emerge following the removal of duplicates in the dataset. A total of 306 duplicate posts were identified, categorized into 20 distinct groups. Notably, the majority of these duplicate posts were generated by a network of bots with a pro-monarchy political orientation, opposing the Iranian government. Additionally, approximately 356 other posts were found to have minor variations compared to the identified duplicates, indicating they were also produced by the same network. Our analysis also revealed the presence of empty posts—those containing only images or non-textual content.

For sentiment analysis, we utilized the Hugging Face Transformers library, specifically loading the pre-trained model "HooshvareLab/bert-fa-base-uncased-sentiment-deepsentipers-multi". This model was employed to classify each post's sentiment into categories such as "Furious", "Angry", "Neutral", "Happy", and "Delighted". To ensure a comprehensive understanding of sentiment, we assigned both a sentiment label and corresponding probability

scores for each category. Each post's sentiment results were integrated into the dataset as new columns, enriching the data with detailed insights into public sentiment.

To provide a clear understanding of the sentiment distribution across the dataset, we created a 2D bar chart that illustrates the frequency of different sentiment categories. This chart effectively displays the count of posts classified as "Furious", "Angry", "Neutral", "Happy", and "Delighted", allowing for an immediate visual representation of public sentiment. By aggregating the sentiment labels, the bar chart reveals how many posts fall into each category, highlighting predominant sentiments expressed by users regarding the topic at hand. This visual tool aids in quickly identifying trends, such as whether negative sentiments outnumber positive ones or vice versa, thereby offering a snapshot of the audience's emotional reactions. The chart's design ensures clarity and ease of interpretation, making it a valuable asset for stakeholders interested in understanding public opinion (Figure 1).
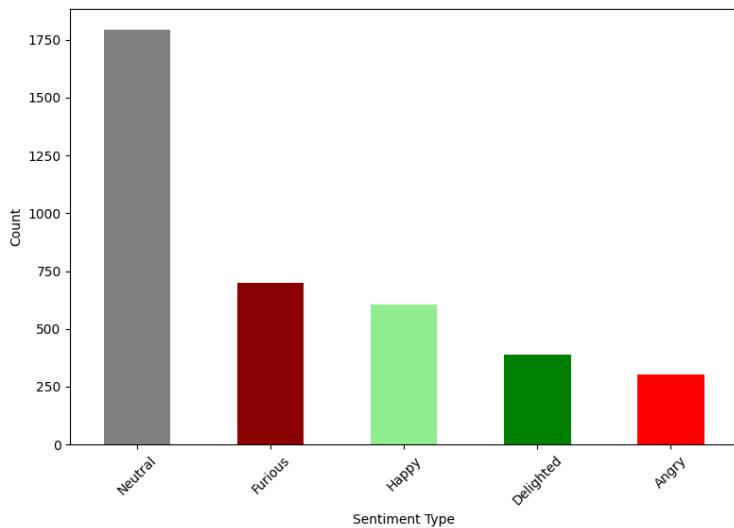

Figure 1. Frequency of sentiments

In addition to the 2D bar chart, we employed a 3D scatter plot to provide a more thorough analysis of sentiment scores associated with each post. The 3D scatter plot visualization provides a compelling illustration of how the data is distributed across various sentiment categories, indicating that there is no significant polarization among the sentiments. This visualization effectively demonstrates that sentiments are well-balanced, with a coherent distribution of both radical and moderate responses within each sentiment category. By allowing viewers to explore the intensity of sentiment scores in relation to individual posts, the 3D scatter plot reveals intricate patterns that are

not easily discernible in a two-dimensional format. The arrangement of data points highlights the diversity of public sentiment, showcasing those emotional responses are spread across the spectrum rather than clustering around extreme views. This balanced distribution offers valuable insights into the overall emotional landscape, suggesting a nuanced public reaction rather than a polarized viewpoint (Figure 2).
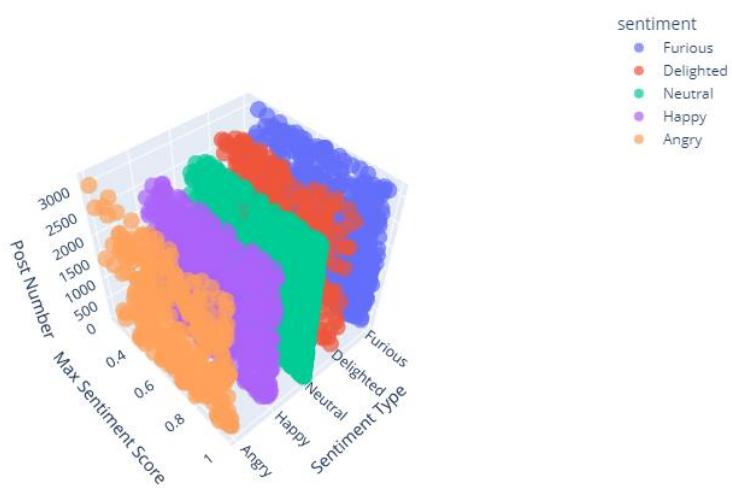

Figure 2. 3D visualization of sentiment scores for each post

After those analysis, K-Means clustering was utilized to identify the optimal number of clusters within the dataset of posts. The initial step involved vectorizing the text using a TF-IDF Vectorizer, which converts the cleaned text into numerical features by evaluating the importance of words while omitting common English stop words. This method ensures that the most relevant words are emphasized in the clustering process, thereby improving the model's accuracy.

To determine the ideal number of clusters, the Elbow Method was employed. This technique entails plotting the Sum of Squared Distances (SSD) against a range of cluster numbers (k). The resulting plot exhibited a noticeable "elbow point" between the clusters at k=8 and k=9, indicating that these values represent an optimal balance between explained variance and the total number of clusters. This observation suggests that using eight or nine clusters effectively captures the underlying structure of the dataset, facilitating meaningful grouping and analysis of similar posts (Figure 3).

In addition to the Elbow Method, a Silhouette Analysis was performed to further evaluate the quality of the clustering. The Silhouette Score was calculated for various numbers of clusters to assess how distinctly separated the clusters were. The results indicated that both k=8 and k=9 yielded the highest Silhouette Scores, thereby

confirming that these two cluster counts provide the most pronounced separation between the groups of posts. This suggests that either 8 or 9 clusters effectively captures the structure of the dataset while ensuring that the individual clusters remain well-defined (Figure 4).
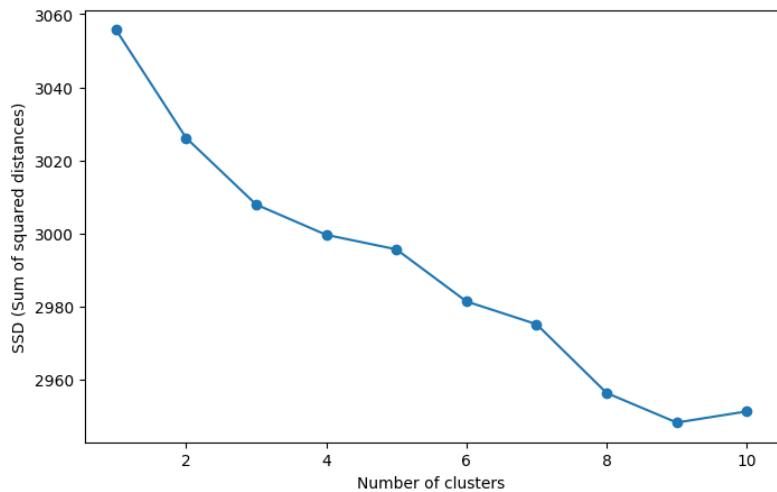
Figure 2. Elbow method for optimal k
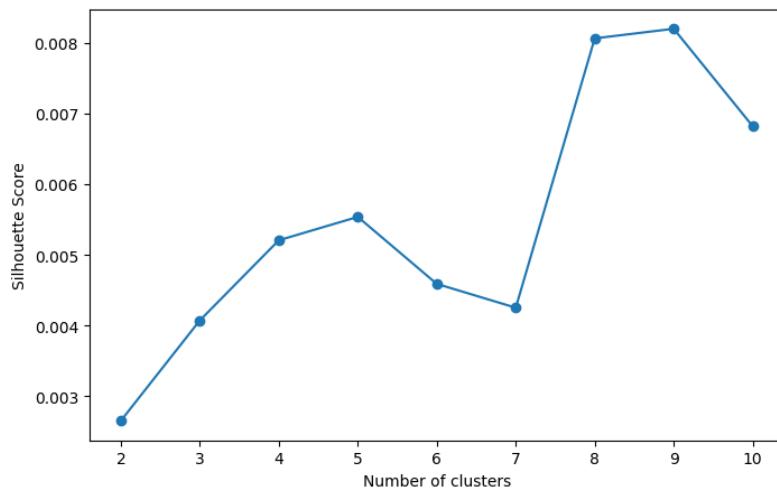
Figure 3. Silhouette analysis for optimal k

In addition to the previous analyses, the Davies-Bouldin Index was calculated to further determine the optimal number of clusters for the dataset. This index evaluates the average similarity ratio of each cluster with its most similar cluster, where lower values indicate better clustering quality. The analysis was conducted for a range of cluster numbers, and the results highlighted that k=8 produced the most favorable Davies-Bouldin Index score. This outcome suggests that

eight clusters not only provide an effective partitioning of the dataset but also ensure that the clusters are well-separated from each other, confirming the robustness of this choice in capturing the underlying structure of the data (Figure 5).
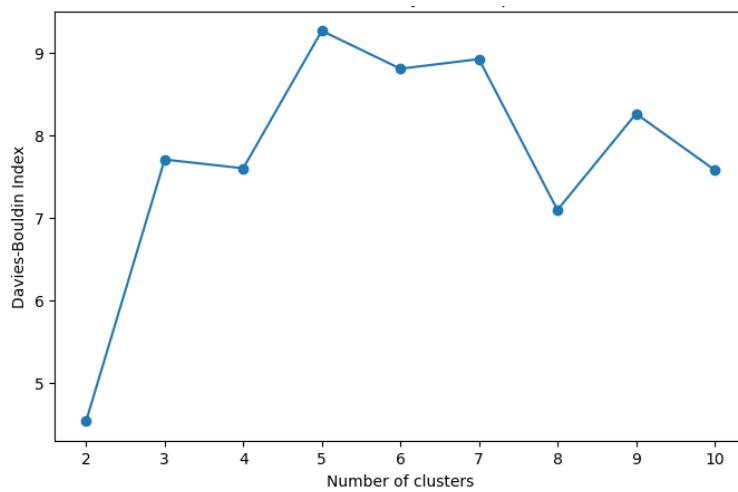
Figure 4. Davies-Bouldin analysis for optimal k

As the final assessment in our clustering evaluation, the Calinski-Harabasz Index was employed to determine the optimal number of clusters within the dataset. This index, known for measuring the ratio of between-cluster dispersion to within-cluster dispersion, serves as a crucial metric for evaluating clustering performance. A higher Calinski-Harabasz score signifies a clearer separation between clusters, indicating more effective clustering. Upon analyzing various cluster configurations, the results indicated that k=8 achieved the highest Calinski-Harabasz Index score. This finding corroborates the selection of eight clusters as the most appropriate partitioning of the data, enhancing both the clarity and interpretability of the resulting clusters (Figure 6).

The results from the four clustering analyses—Elbow Method, Silhouette Analysis, Davies-Bouldin Index, and Calinski-Harabasz Index—consistently indicated that the optimal number of clusters for the dataset is eight. Each analysis provided unique insights into the clustering quality, but they converged on the conclusion that eight clusters offer the best balance of separation and compactness among the post groups. This consensus reinforces the robustness of our clustering approach and enhances the reliability of the insights derived from the analysis.
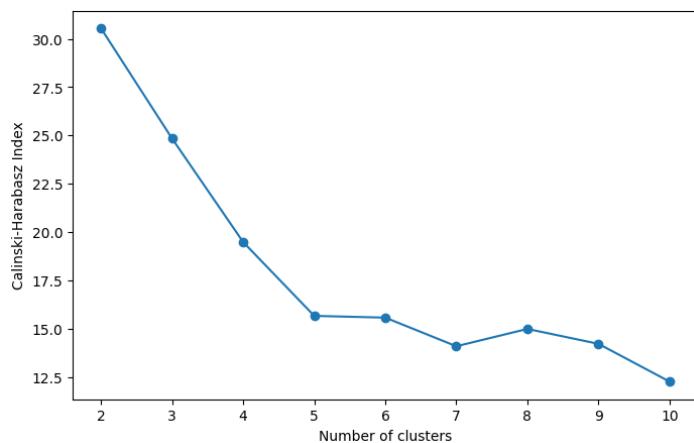
Figure 5. Calinski-Harabasz analysis for optimal k

In this part of our analysis, we employed a keyword cloud generation technique to visualize the most frequently occurring terms associated with each sentiment category (Figure 7). This approach facilitates a deeper understanding of the thematic elements underlying public sentiment towards the topic under investigation. By aggregating the cleaned text from posts classified under similar sentiments, we were able to construct comprehensive visual representations that highlight key terms.

The implementation involved several steps, beginning with the loading of the sentiment analysis data into a Pandas DataFrame. We ensured that the data was appropriately encoded to avoid any decoding errors. Following this, we calculated the frequency of different sentiment categories present in the dataset. For each sentiment category, we concatenated the cleaned text of all posts that fell under that sentiment, allowing us to capture a broad spectrum of language used in those contexts. This aggregation served as the foundation for generating the keyword clouds.

To enhance the quality of the keyword clouds, we excluded specific unwanted terms that could skew the results. These stopwords, which included common but irrelevant terms, were filtered out to ensure that the generated clouds reflected only the most significant and meaningful words associated with each sentiment. Using the Counter class, we counted the occurrences of the remaining words, which enabled us to identify the most frequently used terms effectively.

The final step involved the creation of the keyword clouds using the WordCloud library, which provided a visually appealing representation of the data. Each keyword cloud displayed the words in varying sizes, corresponding to their frequency of occurrence. Larger words indicated higher frequencies, thus signifying their prominence in the discussions related to each sentiment category. This visual output not only enriches the overall analysis but also allows stakeholders to

quickly grasp the dominant themes and sentiments expressed within the dataset. Ultimately, the keyword clouds serve as an innovative tool for summarizing the linguistic trends associated with public sentiment, providing a clearer picture of how individuals articulate their emotions and thoughts on the subject matter.

Figure 6. Word clouds

The analysis of sentiment distribution across different clusters of posts is a crucial aspect of understanding the nuanced emotional landscape present within the dataset. In this project, we utilized a sophisticated pipeline for sentiment classification based on the "HooshvareLab/bert-fa-base-uncased-sentiment-deepsentipers-multi" model. This model was employed to assign sentiment labels—specifically "Furious", "Angry", "Neutral", "Happy", and "Delighted"—to each post after transforming the cleaned textual data into numerical representations.

Once sentiment analysis was conducted, we aggregated the results to visualize how sentiments varied across the identified clusters. A heatmap was created to effectively display the sentiment distribution for each cluster. The heatmap presents a clear visual representation of the counts of different sentiment types within each cluster, allowing for an immediate assessment of the emotional tone prevalent in the posts grouped together by K-Means clustering (Figure 8).

The heatmap revealed distinct patterns in sentiment distribution, highlighting the emotional clustering of posts around specific topics or themes. For instance, certain clusters may predominantly feature posts categorized as "Happy" or "Delighted", suggesting a generally positive sentiment towards particular events or subjects discussed within those clusters. Conversely, other clusters might show higher counts of "Furious" or "Angry" posts, indicating that they contain content related to controversies or negative reactions from users.
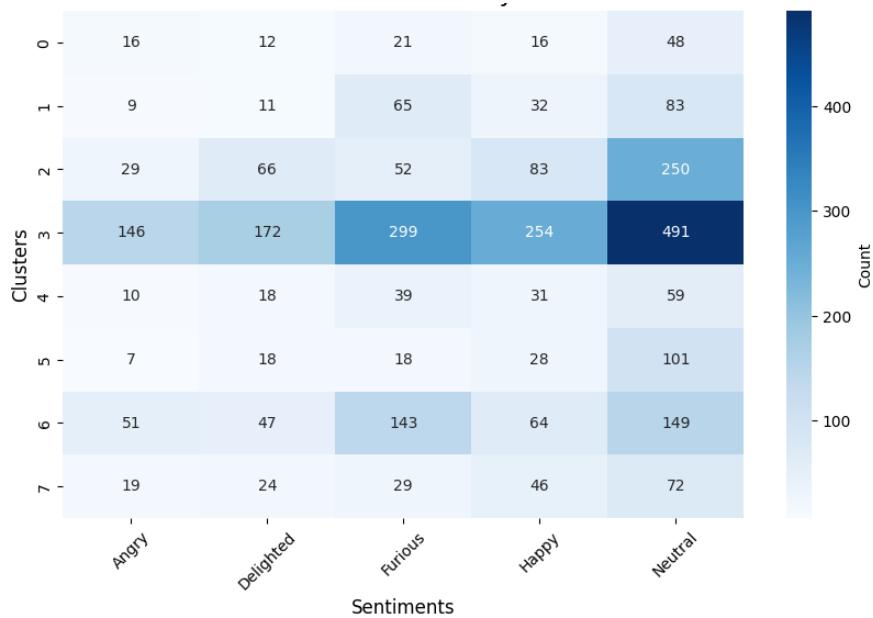
Figure 7. Sentiment distribution by cluster

In this final stage of our analysis, we focused on distilling the essential themes and concepts from the clustered posts into coherent summaries. Building upon the previous work where we employed the K-Means clustering algorithm to organize the cleaned post data, we sought to capture the core discussions within each of the eight distinct clusters formed. This systematic approach allowed us to delve deeper into the nature of the sentiments and topics represented in our dataset.

Having categorized the posts into clusters, we leveraged a pre-trained summarization model, specifically "sshleifer/distilbart-cnn-12-6", to extract succinct summaries for each cluster. The summarization process began by defining a function called summarize_cluster, which retrieves all posts belonging to a specific cluster. By aggregating these posts into a single coherent text block, we aimed to reflect the collective sentiment and discussion within that group.

To facilitate effective summarization, we divided the combined cluster text into manageable chunks, each consisting of up to 512 words.

This segmentation was crucial, as it aligned with the input limitations of the summarization model, ensuring that each piece of text could be processed efficiently. Each chunk was subsequently analyzed to generate summaries that encapsulated the key points and themes from the posts. These individual summaries were then consolidated into a final, comprehensive summary for the entire cluster.

The resulting summaries serve as a distilled representation of the underlying discussions, highlighting the significant sentiments and themes present within each group of posts. This final analysis not only synthesizes the complexity of the post data into more digestible insights but also enhances our understanding of the public's reactions to relevant events, such as the Paris Olympics.

Cluster 0. Underscores Iran's steadfast commitment to its sovereignty over the three islands—Abu Musa, Greater Tunb, and Lesser Tunb—in the Persian Gulf, conveying a strong nationalistic sentiment. The discourse stresses urgency regarding any foreign claims or interference, particularly from neighboring Arab states or global powers, warning that such actions could unify Iranian citizens against external threats. It also raises concerns that challenges from the United Arab Emirates (UAE) may escalate tensions and provoke conflicts. The islands' symbolic and strategic importance for Iran's national security is emphasized, with the potential closure of the Strait of Hormuz highlighted as a catalyst for geopolitical repercussions. Overall, the discussion reflects a resilient stance on Iran's claims, serving as a unifying issue for its people across political divides.

Cluster 1. This cluster highlights the geopolitical tensions surrounding Iran's sovereignty claims over the three islands, with a particular focus on perceived opposition from major global powers, including Russia and China, as well as European and certain Arab states. The discourse reflects a sense of betrayal, noting that these external actors appear aligned against Iran's territorial integrity. Such international dynamics are viewed as reinforcing a collective Iranian resolve to defend national sovereignty, positioning foreign interference as a unifying threat among the Iranian populace.

Cluster 2. Cluster 2 addresses the European Union's stance, which challenges Iran's claims of sovereignty over the three islands. The EU, often joined by Arab countries, is portrayed as invoking international law to question Iran's legitimacy over the islands, instead supporting the UAE's claims. From Iran's perspective, these actions are seen as inconsistent and hypocritical, especially when viewed against other EU foreign policy actions. This discourse underscores a call within Iran for the defense of historical and legal rights, framing EU involvement as an overreach that intensifies Iran's insistence on its territorial claims.

Cluster 3. This cluster reflects a strong emphasis on the historical

legitimacy of Iran's ownership of the three islands, often citing the Pahlavi era as a foundational period that established Iran's control. The discourse frames the islands as integral to Iranian identity, asserting that any concession would contradict the nation's cultural and historical heritage. Thus, Iran's sovereignty over the islands is presented as non-negotiable, reinforced by a narrative of historical continuity that transcends contemporary political divisions.

Cluster 4. Cluster 4 focuses on Iran's response to external challenges posed by the European Union and the Gulf Cooperation Council, both of which question Iran's sovereignty over the islands. The narrative emphasizes that these interventions are perceived as attempts to weaken Iran's unity and territorial integrity. In this cluster, Iranian sovereignty is presented as absolute under international law, and external challenges only serve to deepen domestic calls for solidarity and resistance against what is seen as unwarranted interference.

Cluster 5. This cluster critically examines Iran's isolation within the international community, attributing it to the nation's foreign policy, which has, in turn, impacted its economic and social wellbeing. Concerns are raised that failing to assert sovereignty over the islands could invite further territorial challenges. The discourse is critical of current policy strategies and advocates for a firmer, more unified stance to safeguard Iran's territorial integrity in the face of increasing foreign claims and pressures.

Cluster 6. In Cluster 6, the discourse posits that Iran's sovereignty over the three islands could be more effectively preserved under a restored monarchy led by Reza Pahlavi. The islands are described as both sacred and historically inseparable from Iran, with any concession regarded as an affront to national identity. This perspective emphasizes a return to imperial governance as a potential path to ensuring Iran's territorial sovereignty and as a defense against external claims.

Cluster 7. This cluster offers a historically grounded argument, positioning the islands as integral to Iranian territory since ancient times, with roots extending to the Achaemenid Empire. The discourse in this cluster dismisses European and Emirati claims as lacking historical and legal substantiation, instead calling for broader international recognition of Iran's longstanding sovereignty. This view emphasizes a historical continuity in Iran's claims, framing the islands as inherently and exclusively Iranian territory by virtue of centuries-old regional influence.

6. Conclusion
This study provides the first systematic, data-driven examination of public discourse and sentiment regarding Iran's sovereignty over the

three Persian Gulf islands through the lens of Persian-language social media. By integrating natural language processing (NLP) techniques with sentiment and clustering analyses, the research offers a novel empirical foundation for understanding how ordinary citizens engage with complex geopolitical issues in the digital era. Unlike traditional diplomatic or historical analyses, this study captures the immediacy, plurality, and emotional dynamics of online public opinion, demonstrating that social media has evolved into both a mirror and an amplifier of national consciousness in response to global political provocations.

Findings reveal that Iranian users' responses to the 2024 European Union–Gulf Cooperation Council statement were multifaceted yet deeply anchored in themes of sovereignty, national identity, and resistance to perceived foreign intervention. Rather than displaying clear polarization, the sentiment distribution was balanced, suggesting a spectrum of emotional engagement ranging from fervent nationalism to cautious critique of Iran's foreign policy strategies. The clustering analysis further illuminated eight distinct thematic constellations within the discourse, reflecting historical continuity, international skepticism, and varying interpretations of Iran's geopolitical isolation. These results illustrate how social media functions as a digital agora where national identity, memory, and power intersect—where users reinterpret historical grievances and articulate modern expressions of sovereignty within an algorithmically mediated public sphere.

The implications of this research extend beyond the Iranian context. The methodological framework—combining large-scale data collection, Persian-language NLP, and sentiment-driven thematic modeling—demonstrates how digital ethnography can enrich geopolitical studies by capturing the emotional and discursive dimensions of foreign policy debates. The study also highlights the growing role of social media platforms as arenas where international narratives are contested in real time, influencing both domestic perceptions and external diplomatic engagements. Future research should expand this approach through multilingual and cross-platform analyses to examine how competing global actors construct and disseminate their narratives regarding the same territorial disputes.

We argue that the struggle over the three islands is not merely a contest of territory but a negotiation of meaning—one unfolding simultaneously in diplomatic chambers and digital networks. A deeper understanding of how sovereignty, legitimacy, and identity are being redefined in the 21st century, where political discourse is increasingly mediated through data, algorithms, and public emotion will help the politicians find a better solution to territorial disputes in the highly sensitive regions like Persian Gulf.

Conflict of interest
The authors declared no conflicts of interest.

Authors' contributions
All authors contributed to the original idea, study design.

Ethical considerations
The authors have completely considered ethical issues, including informed consent, plagiarism, data fabrication, misconduct, and/or falsification, double publication and/or redundancy, submission, etc. This article was not authored by artificial intelligence.

Data availability
The dataset generated and analyzed during the current study is available from the corresponding author on reasonable request.

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