Rites de Passage: Elucidating Displacement to Emplacement of Refugees on Twitter

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ABSTRACT
Prior refugee-related studies have primarily examined social media deliberations to probe societal opinions around a specific refugee event. Contrarily, our study attempts to identify the various stages of their journey from displacement to emplacement in the host nation. We draw insights from Gennep’s seminal work, i.e., Les Rites de Passage, to identify four phases of the refugee journey: Arrival of Refugees, Temporal stay at Asylums, Rehabilitation, and Integration of Refugees into the host nation. To test our proposed framework, we have collected multimodal tweets from April 15, 2020, to March 15, 2021. A fusion of BERT+LSTM (for text inputs) and InceptionV4 (for image inputs) has reported an F1-score of 80.93%. Subsequently, we collected multimodal tweets related to the 2022 Ukrainian refugee crisis. An F1-score of 71.88% for this 2022 crisis confirms the generalizability of our proposed framework.

CCS CONCEPTS
• Information systems; • World Wide Web; • Web applications; • Social networks;

KEYWORDS
Refugee Journey, Social Media, Twitter, Multimodal Framework, 2022 Ukrainian Refugee Crisis

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1 INTRODUCTION
34,361 deaths recorded. Not all the deaths occur at sea, but also in detention blocks, asylum units . . . Some entries have a name and a story, but the majority are anonymous data points – just over 1,000 are named . . . Some 400 have taken their own lives; more than 600 have died violently at the hands of others. - The Guardian, June 20, 2018

The conventional myth is that refugee deaths occur only at sea, but the above excerpt debunks the myth. Refugees face adverse environments not only in the Mediterranean Sea but also after crossing the Mediterranean Sea – if they are lucky. The sufferings of refugees continue at detention blocks or asylums. These struggles and subsequent unfortunate events, such as deaths, are pressing social concerns. To explore their traumatic journey, we draw insights from the seminal work 'Les Rites de Passage' (1909; The Rites of Passage) by Arnold van Gennep [33]. Gennep systematically studied the passage of individuals from one social status to another [33]. He has identified three distinct stages of this journey: separation, transition, and reincorporation. To the best of our knowledge, none of the prior AI-based studies have employed this framework to explore the transition of refugees from their home to host nation. A plethora of studies probed refugee-related issues using social media data, such as Twitter [2, 9, 17, 18, 21, 25]. While the relevance of social media data for extracting relevant and actionable information was widely acknowledged, refugee-related studies mainly probed refugee-related societal opinions around a specific crisis or event [25, 26]. These studies did not shed light on their journey from displacement to emplacement. BenEzer and Zetter [7] pointed out that 'the refugee journey is the defining feature of the exilic process: it is a profoundly formative and transformative experience and a 'lens' on the newcomers' social condition'. Thus, we employ Gennep’s framework to study their journey.

We have identified four phases of the refugee journey: Arrival of Refugees, Temporal stay at Asylums, Rehabilitation, and Integration of Refugees into the host nation. It is worth noting that we have not attempted to track the journey of an individual refugee for ethical concerns but explored it at the macro-level. We collected multimodal tweets from April 15, 2020, to March 15, 2021. Initially, we have considered unimodal models such as Bidirectional Encoder Representations from Transformers (BERT) [12] + Long-Short Term Memory (LSTM) (for text inputs); and InceptionV3 [30], VGG19 [27], and ResNet [14] (for visual inputs). Next, we have employed an early fusion of these unimodal models, and our BERT+ LSTM + InceptionV4 [29] model has reported an F1-score of 80.93%. Subsequently, we collected multimodal tweets related to the 2022 Ukrainian refugee crisis and tested the generalizability of our proposed framework. Our findings, i.e., an F1-score of 71.88% for this 2022 dataset, strongly indicate that the phases of the refugee journey from displacement to emplacement were identical.

2 REFUGEE ISSUES & SOCIAL MEDIA
Refugee issues are associated with a wide range of socio-economic consequences. A challenging environment in the host country can have adverse consequences on the psychological wellbeing...
of refugees [20]. On the other hand, the significant presence of refugees can impact the economic conditions of the host country [4, 28]. Thus, prior AI-based studies, such as [24, 25], have noted negative sentiments towards refugees. A significant portion of Twitter deliberations revolves around xenophobic and nationalistic themes. Kreis [21] has pointed out that the discourse of racism against refugees is mainly propounded by the nationalist-conservative and xenophobic right-wing political parties in the European context. However, in addition to this widespread antipathy and animosity towards migrants and refugees, Twitter-based studies also noted sympathy and solidarity activities by a certain section of the host nations [19]. In short, two dominant perspectives on the Twitter platform are - an apprehensive far-right perspective where refugees were considered terrorists or rapists, which leads to security and safety concerns in the host countries, and a sympathetic and humanitarian approach to helping refugees [17, 26]. Some Twitter-based studies also probed linguistic contents for analyzing migration movements across nations [32, 35]. Another stream of studies examined the emotional responses to refugee-related image(s). For instance, the death of the three-year-old Alan Kurdi in the Mediterranean Sea was one of the most unfortunate refugee-related events in recent times [2, 9, 15, 23]. This shocking image of the drowned Syrian kid appeared on the screens of 20 million people worldwide in less than 12 hours after the first release, and it became viral with more than 50,000 tweets per hour [34]. Adler-Nissen et al. [2] probed - how the above image influenced emotional responses and, subsequently, the impact of cumulative emotional responses on international relationships and foreign policy deliberations. They observed that the tragic incident had changed the discourse from an open-door approach to stopping refugees from arriving. Similarly, Bozdag [9] also noted that the public interest in refugees gained momentum after this tragic incident. To sum up, this brief review indicates that AI-based studies using social media data mainly probed societal opinions in the context of a specific refugee-related event, such as the terrorist attack in Paris, the sexual assault in Cologne, or the unfortunate death of Alan Kurdi [9, 15, 17, 23, 25, 26] – not the voices of refugees [18] or their journey. Thus, we address this research gap by identifying various phases of their journey from displacement to emplacement.

3 REFUGEE JOURNEY: RITES DE PASSAGE?

The ceremony terminates in rites of incorporation – a formal entrance, a meal in common, an exchange of handclasps. - Chapter 3: Individuals and Groups

The above two excerpts from Gennep’s antiquarian work indicate a striking resemblance between the century-old ‘magico-religious’ barriers and today’s Islamophobia due to the middle east refugee crisis [33, 36]. Foreigners (i.e., refugees) cannot immediately enter the territory of the host nations. They need to ‘prove their intentions from afar’ to border forces, and there is a lot of ‘palaver’ involved in this process. However, during this period, refugees get food and lodging (i.e., asylums) from inhabitants (i.e., host nations). Finally, rites of incorporation can be equated to the social integration of refugees in the host nations. For instance, Castle and Diarra [10] note that the migration process of young Malians ‘comprises social and psychological dimensions pertaining to the need to explore new places, experience new settings, and accumulate material possessions in order to conform to peer group aspirations’. They conclude that the migration of these young Malians ‘is as much a rite of passage (emphasis added) as a financial necessity’ [10].

Gennep’s seminal work has identified three distinct phases, namely, pre-liminal rites (i.e., ‘rites of separation from a previous world’), liminal (or threshold) rites (i.e., ‘those executed during the transitional stage’), and post-liminal rites (i.e., ‘the ceremonies of incorporation into the new world’). These three stages are also referred to as separation (getting detached from the previous world and loss of identity), transition, or liminal stage (the individual has got detached from her previous world and lost her old identity but not joined the new world), and incorporation (getting a new identity after incorporation into the new world). Monsutti [22] employed this analogy to explore the journey of young Afghans. In the initial phase, young Afghans get separated from their families and homes. In the next phase, ‘they have to prove their capacity to face hardship and to save money . . . represents a period of liminality’, and finally, in the reincorporation phase, they ‘return to their village of origin . . . as adult marriageable men’ and mostly they continue to commute between Afghani-stan and Iran for the rest of their life [22].

We also employed the above three stages for probing the refugee journey, which starts after they plunge into the ocean. If they are lucky, they arrive at their desired destination. We have conceptualized pre-liminal rites as the ‘Arrival of Refugees’. Refugees are getting separated from their previous world, getting detached from their families, and taking a leap of faith through risky sea routes as anonymous data points after losing their identity. BenEzer and Zetter [7] pointed out that the ‘mode of travel may influence the meaning of the journey and its impacts on the individual . . . For someone who has not . . . crossed the sea before, the mode of travel will be a highly symbolic part of the experience of the journey’. Thus, for this phase, we have considered tweets deliberating or sharing information about the mode of travel or tweets related to border control forces.

We have considered two interrelated but distinct stages of liminal (or threshold) rites as follows: ‘Temporal stay at Asylums’ (second phase) and ‘Rehabilitation of Refugees’ (third phase). Asylums are a place of social dissolution and a place of new beginnings where sociality is remoulded in new ways and it is crucial to ‘explore the
precarity of life in the camp . . . in this temporary space (emphasis added) [31]. Accordingly, our tweets in this category capture the living conditions in refugee asylums and images of asylums and camps. In asylums, refugees need health support because many refugees arrive with health problems. They 'face continued disadvantage, poverty and dependence due to lack of cohesive support in their new country . . . This is compounded by language barriers, impoverishment, and lack of familiarity with the local environment and healthcare system' [16]. Thus, tweets from this third phase share information and images of various support activities like arrangements of medical aids, donations of food items or garments etc.

We have conceptualized the post-liminal rites as the 'Integration of Refugees' into the society of the host nation. Charitable organizations arrange various support activities, such as helping them to learn a new language. For instance, Syrian refugees in Germany try to learn German for better social inclusion [1]. Hence, this category of tweets shares information about the arrangement of the education system for refugee kids or vocational training programs for adult refugees. These skill up-gradation activities help refugees to settle down in the host nations [6]. Finally, we have identified another distinct type of multimodal tweet where text content might be related to the above phases, but image content shares refugee-related statistics or data points through graphical images or charts. These tweets can be crucial for information dissemination, and we have labeled this category of tweets as 'Infographics'.

4 DATA

We note that prior refugee-related studies mostly considered unimodal inputs, i.e., either text [24, 25] or visual contents [15, 23]. However, multimodal approaches are generally more efficient than unimodal approaches [8, 13], but none of the prior refugee-related studies considered multimodal inputs to the best of our knowledge. Thus, we consider multimodal tweets. We have employed Twitter’s search API, and considered a set of keywords like refugee, refugee camps, refugee asylums, migration, migration policy, etc. We have collected 3.98 million refugee-related English tweets from April 15, 2020, to March 15, 2021. Next, we dropped tweets without images, duplicate tweet-ids, and tweets with similar text contents. Our corpus size became 0.23 million multimodal tweets (i.e., 5.7% of 3.98 million).

For resource limitations, we randomly selected around 2500 tweets from our corpus of 0.23 million tweets. For annotating tweets related to 'arrival of refugees', we have considered the following aspects: arrival through sea routes, risk of traveling through sea routes, mode of transport, and activities by border control forces. Similarly, the 'rehabilitation of refugees' phase has considered the activities such as arranging medical aid, charity activities by non-government organizations (NGOs), or facilitating donations of essential livelihoods. We have carefully analyzed each tweet based on its text content and the associated image for assigning the final class. We note that most tweets are about refugees by charitable organizations or volunteers, and only a tiny portion of our sample captures the voices of refugees [18, 19]. Also, we discarded tweets with poor images or cryptic short texts. Two annotators manually annotated 1722 tweets with distinct text-image pairs with an inter-rater reliability of 0.84. These 1722 tweets are distributed as follows: Phase 1: 398 tweets; Phase 2: 387 tweets; Phase 3: 289 tweets; Phase 4: 343 tweets; and Infographics: 305 tweets. We randomly split our 1722 annotated tweets into 80% (as a training dataset) and 20% (as a test dataset) for our analysis. Table 1 reports a few representative tweets from our corpus.

Table 1: Representative Multimodal tweets from our Annotated Data (Apr 15, 2020, to Mar 15, 2021)

| Visual Input | Language Input |
|--------------|---------------|
| @Mirocosco intercepts nearly 200 migrants trying to reach #Spain. The Spanish coast guard intercepted 186 migrants this week who tried to reach Spain using makeshift crafts, including jel- liad and kayaks. | On August 18, 2020, a total of 167 migrants were found in the back of a lorry in Santiago, Turkey. The migrants (from Afghanistan and Pakistan) tried to travel to Europe due to the hot weather, and feared the separation covers during a regular road control by police. |
| More than 3,000 Syrians living in Idlib's refugee camps have lost their shelter after days of relentless rain and snow. Although some have left their camps, many families have no choice but to live in flooded tents. | Proposed EU’s Pact on Migration and Asylums will not help alleviate migration pressure on EU’s southern member states. Migrants - EU’s Pact on Migration and Asylums will do little to ease pressure on southern member states. Refugees (@EuropeanUnion) |
| UNHCR joined a national polio vaccination campaign that started today. Some 16000 Palestinian refugee children under 5 will be vaccinated at all health centers in Syria. Child vaccination is an important part of primary health care. UNHCR provides to Palestinian refugees. | A recent fire destroyed an entire refugee camp on a Greek island and we were able to respond quickly with food. Our monthly donors allow us to respond quickly. We couldn’t do it without our ACT! Donors. Set up your monthly gift here. |
| By purchasing the School Enrollment fees for a refugee girl through our online gift shop, you are helping her survive, recover and build a better future. Help improve her chances of escaping poverty with #InternationalMomentDay | YogaGirls is so important. Young women and girls still do not have equal access to human rights, education and health. This needs to change. Today I pledge to keep advocating for refugee girls to make sure they can thrive. |
| At the end of 2019, the number of @Refugees worldwide was 79.5 million. Germany takes in a great amount of refugees, yet the number of #RefugeesGerman has dropped sharply since the refugee crisis of 2015. We give you an insight into the 2019 German statistics. | Here’s undocumented migrants apprehended at the US-Mexico border by Border Patrol since April 2019. The largest increase of these 3 categories is by far, from December to January, was 70% (5 countries) – 97%. Arrivals from Mexico and Central America were up only slightly. |
instance, we note that hate tweets towards refugees are primarily associated with refugee arrivals. Similarly, some of the sympathetic tweets are related to rehabilitation and integration. Overall, we find that multimodal tweets are more informative than unimodal tweets in our corpus, which justifies our sample selection. Additionally, we note that common objects (except the Infographics class) are human beings for a significant portion of our visual inputs, i.e., images of refugees arriving through sea routes, or images of refugees with border control forces, or images of refugees at asylums, or images of refugees receiving donation or supports. Thus, in comparison to other standard image datasets (which are comprised of distinctly different objects like flowers, animals, or buildings), our image dataset is challenging for computer vision algorithms.

5 METHODOLOGY AND FINDINGS

We have initially considered unimodal models for text, i.e., BERT + LSTM, and visual inputs, i.e., InceptionV3 [30], VGG19 [27], and ResNet [14]. Subsequently, we have also employed an early fusion of the above unimodal models. In LSTM, the input sequence feed is only in the forward direction. However, BERT models consider the contextual representation of a word to decipher the difference between two contexts [12]. Consequently, LSTM models with BERT embedding are more efficient in capturing the contextual representation than LSTM models without BERT embedding. We have considered the English language uncased base version of the BERT model with 12 hidden layers, 768 hidden sizes, and 12 self-attention heads. CNN-based algorithms, comprised of convolution layers, max pooling, and fully connected layers, are most efficient for solving complex computer vision tasks. Like language encoders, visual encoders also extract the dominant visual features from an input image and map it into pre-defined categories for the downstream image classification task.

For the VGG-19 model, we have considered the weights based on pre-trained models, but we have trained the output layer using our dataset for the final classification task [27]. Next, we consider ResNet [14] or Residual Networks models. These models skip connection to add the output from a previous layer to a later layer, which tackles the vanishing gradient problem. We have used ResNet with its ImageNet pre-trained weights to initialize the model, and the outputs are followed by dense layers of 256 units and a SoftMax layer [11]. Our third CNN architecture-based model is InceptionV3, which is known for its efficiency in interpreting images and detecting objects [30]. We have also considered the InceptionV4 model for multimodal fusion [29].

Multimodal models leverage the advantages of both modalities by combining two parallel deep neural architectures (i.e., natural language processing for textual inputs and computer vision techniques for visual contents) for the downstream task. We have employed an early fusion-based approach, i.e., integrating features directly after they are extracted, on the outputs from these two models to get the final class from a multimodal tweet. Early fusion allows to perform multimodal representation learning—as it can learn to exploit the correlation and interactions between low-level features of each modality. In other words, this joint representation is concatenating different modality features at a low level [5].

We resized the pictures according to model specifications. For classification, we partially freeze the pre-trained weights and add a dense layer with a dropout layer (p = 0.4), followed by a linear layer to extract the latent features. Next, we have added a dense unit of 128 before concatenating it with the language model stack. We pass both visual stack and language stack through a shared dense layer of size 128 and concatenate the outputs to form a joint vector of length 256. We also apply a dense layer of size 256 before the final SoftMax layer and ReLu activation function. This leads to the final classification layer, i.e., a dense layer with 5 units (for our 5 categories) and SoftMax activation, which will give the predicted class of multimodal inputs. Next, we have used stochastic gradient descent (SGD) for model optimization. For robustness, we have used different learning rates for better learning. We train the model using an SGD optimizer starting with a learning rate equal to 0.001 and then decreasing it using the Reduce Learning Rate on Plateau from keras which automatically changes the learning rate if there is no improvement in training after a certain number of epochs. We have considered the cross-entropy loss function for our modeling because we have multiple classes in our dataset. Table 2 reports the performances of our models using 5-folds cross-validation. For brevity, we have not reported the t-SNE plot, but this plot suggests that the weak performance of BERT + LSTM is primarily due to the Infographics class, where images differ distinctly from other categories but not the text content. As expected, multimodal models, especially BERT+ LSTM + InceptionV4, have outperformed other models.

6 2022 UKRAINIAN REFUGEE CRISIS

The previous section leads to the intriguing question: is our proposed framework of four phases generic or context-specific? To probe the practical relevance of our approach, we have considered the 2022 Ukrainian refugee crisis due to the Russian invasion. More than 4 million Ukrainians had to move to neighboring countries, such as Poland, Romania, Hungary, or Moldova, in a span of one and half months. Another 6 million got displaced within the country because of this military invasion [37]. Ukrainians got displaced from their previous world and left behind all their belongings (and sometimes family members) towards an uncertain future.

We have collected 0.6 million tweets, out of which 0.01 million tweets were multimodal, during February 24, 2022, to March 15, 2022. Our data collection and pre-processing strategies were similar to the previous analysis, but for data crawling - we have added
Table 3: Representative Multimodal tweets from the 2022 Ukrainian refugee crisis (Feb 24, 2022, to Mar 15, 2022)

| Visual Input                                                                 | Language Input                                                                                                                                                                                                 |
|------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Arrival of Refugees                                                          | A Ukrainian refugee pushes her baby in a pushchair as they arrive at the Medyka border crossing, Poland, Saturday, Feb. 26, 2022.                                                                                          |
| Every 2 or 3 minutes, a bus full of refugees is arriving into Kozince’s make-shift reception centre. This is what Europe’s fastest-growing refugee crisis since WWII looks like! Poland #Ukraine |
| Temporal Play at Asylums                                                      | Our camera is the first inside this refugee centre in Roszow. #Poland #UKR Austria Russia Poland UKR Russia #Ukraine #UkraineVar |
| People lie on camp beds at a refugee reception centre at the Ukrainian-Polish border crossing in Kozince, Poland #UkrainianRefugees #Russia #Ukraine #UkraineVar |
| Great to be in ______ this morning and to see the donations they’re collecting to go to Poland, for refugees from #Ukraine. Close to home. thanks for all the donations collected for our ___ refugee foodbank too |
| Polish soldier giving a teddy to a refugee-child from Ukraine. #Ukraine #UkrainianRussianWar #Ukrainian RUSSIAN #UkraineRussia #UkraineVar #UkrainianRefugee |
| Rehabilitation of Refugees                                                    | Ukrainian refugee children fleeing the Russian assault are welcomed with cheers by the nation from their first day at a primary school in Poznan. Also, a video shared on social media shows |
| One of our Dutch kids is headed to Poland tomorrow with aid for the Ukraine. We have bought making happiness postcards for him to give to the refugee children – a little symbol of love and unity. #DutchRefugeesFamily |
| Integration of Refugees                                                       | The number of Ukrainian fleeing the fighting reached 2.7 million by March 13, the UNHCR refugee agency reported, amid concerns over the growing refugee crisis. The country taking the highest number of refugees is Poland, with 1.7 million alone. |
| Infographics                                                                 | Nearly one Ukrainian child becomes a refugee every second – as the UN says an average of 13,000 children a day have escaped Russia’s onslaught over the last 20 days |

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Visual-Meta Appendix

The data below is what we call Visual-Meta. It is an approach to add information about a document to the document itself, on the same level of the content (in style of BibTeX).

It is very important to make clear that Visual-Meta is an approach more than a specific format and that it is based on wrappers. Anyone can make a custom wrapper for custom metadata and append it by specifying what it contains: for example @dublin-core or @rdfs.

The way we have encoded this data, and which we recommend you do for your own documents, is as follows:

When listing the names of the authors, they should be in the format 'last name', a comma, followed by 'first name' then 'middle name' whilst delimiting discrete authors with 'and' between author names, like this: Shakespeare, William and Engelbart, Douglas C.

Dates should be ISO 8601 compliant.

Every citable document will have an ID which we call 'vm-id'. It starts with the date and time the document's metadata/Visual-Meta was 'created' (in UTC), then max first 10 characters of document title.

To parse the Visual-Meta, reader software looks for Visual-Meta in the PDF by scanning the document from the end, for the tag @visual-meta-end. If this is found, the software then looks for @visual-meta-start and uses the data found between these tags. This was written September 2021. More information is available from https://visual-meta.info for as long as we can maintain the domain.

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