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Real-time Migration Risk Analysis Model for Improved Immigrant Development Using Psychological Factors

Dr.R. Udayakumar¹, Dr. Suvarna Yogesh Pansambal², Dr.K. Anbazhagan³ and Dr.R. Sugumar⁴

Abstract

The problem of immigrant migration risk analysis is deeply studied and there are number of issues identified in the selection of country. There exists number of approaches available in the selection of countries towards migration. However, the methods do not produce effective results in the selection of migrant country. To handle this issue, an efficient real-time migrant risk analysis model (RLAM) is presented in this article. The method uses the traces of previous migration histories and data set maintained by the model. Using the migration data set, the method preprocesses the data set for noise removal and normalization. With the normalized data set, the method applies Nation Centric Religious Support Analysis and Psychological Support Analysis. The nation centric religious support analysis algorithm measure the risk factors on religious features by computing National Religious Support (NRS) and the Psychological Support Analysis algorithm computes the value of Psychological Support (PS) for different countries. Based on the result of different analysis, the method computes Migration Support (MS) for various countries towards the selection of migration countries. The proposed model improves the performance of risk analysis and migration control.

Index Terms: Migration Analysis, Risk Analysis, Immigrant Development, Religion, Psychology, NRS, PS, MS.

Introduction

Growing environment changes introduces different disasters in various countries which introduces migration of people from one country to another. The migration of peoples occurs due to various factors like environment change, political, war between countries, economic

¹Dean, CS & IT, Kalinga University, India. E-mail: rsukumar2007@gmail.com, deancsit@kalingauniversity.ac.in, Orcid: <https://orcid.org/0000-0002-1395-583X>

²Associate Professor, Department of Computer Engineering, Atharva College of Engineering, University of Mumbai, India. E-mail: suvarna.atharv@gmail.com, Suvarnashirke@atharvacoe.ac.in, Orcid: <https://orcid.org/0000-0002-8920-1102>

³Professor, Department of Computer Science and Engineering, Saveetha School of Engineering, Simats, Chennai. E-mail: rishianbu@gmail.com, Orcid: <https://orcid.org/0000-0002-4823-7846>

⁴Professor, Institute of CSE, Saveetha School of Engineering, Saveetha Institute of Medical & Technical Sciences, Thandalam, Chennai, India. E-mail: sugu16@gmail.com, Orcid: <https://orcid.org/0000-0002-0801-6600>

problems and so on. However, the citizens of countries migrate to different countries as their wish, but the selection of country is depending on various factors. In general, the people migrate to a country as their geographic neighbor. The people migrate to another country for their economic growth, but there are other factors they consider in the problem of migration.

The migration analysis is the process of analyzing the factors and risk of migration to support the selection of country to which migration can be performed. For example, the Asian peoples migrate to Europe for their growth in economic status. In this case, the people face number of issues in the country where they have been moved. Any countries in the world have two different categories of peoples in terms of religion as majority and minority. The majority people fall under specific religion and have full freedom on the worship. The minority people would belong to another religion. For many Middle East countries, the people belong to majority religion feeling safe to live in the country, where the minority people do not feel such freedom. The minority people face variety of threats and attacks on their ideology and personal life. For example, the Hindu people in Pakistan faces different religious challenges as like the minority people faces challenges in some other countries. This phenomenon is suitable for any part of the world. So, by considering the religious freedom; the security of minority people in the country can be analyzed.

On the other side, the political policy of the country introduces different psychological impact on the migrant people. By considering the psychology of the peoples who have migrated earlier, the support of country for the migrants can be analyzed. The people who have migrated earlier would have a thought on their mind about the country according to their experience. This must be considered in migration analysis, because it has higher impact on the migration control. To perform such risk analysis, there are number of approaches available which would consider only few factors in analyzing the risk of the country in migration. To handle this issue, an efficient real time migration risk analysis model is presented in this article (Eckhart, M, 2019). The method considers different psychological and religions factors in analyzing the risk of the country in migration and measuring the migration support for any country towards the selection of migration country. The article structured to present the detailed information about migration and risk analysis in section 1, where section 2 presents the detailed review on the methods of risk analysis and migration. Section 3, discuss the detailed working of the proposed model and section 4, analyzes the experimental results in detail and section 5 presents the conclusion of the work.

Related Works

There exist number of approaches against migration risk analysis and such approaches are detailed in this section.

An cardio vascular disease prediction model is presented in (Rosenthal T, 2022), which monitors the hypertension and other factors in migrants to perform prediction.

A vignette adjusted measure-based risk analysis model is presented in (Batista, C., 2014), which consider the list within aversion and entrepreneur in migrant society to perform risk analysis.

A migrant risk analysis model is presented in (Deole, 2023), which analyze the immigrant native gap in preferences and time with the use of social and economic features. An alternative model is presented for risk governance which consider participation and inclusion, benefits with cost, and stakeholder impact.

A policy-based model is presented in (Manji, K., 2023), which uses the policy documents of government to construct the issues present in health sector from the immigrants at national level in South Africa. A data driven undocumented immigration model is presented in (Scott Rodilitz, 2021), towards analyzing undocumented migration of Mexican immigrant to United States. The model considers departure and return dates in analyzing the happiness of immigrants. A smart camera model is presented in (Dekkers, T., 2019), to perform migration control by Royal Netherlands with a case study.

The risk of aversion on migrant willingness is presented in (Huber, P., 2020), which uses three-dimension data to analyze the willingness of immigrant on various transition countries. It analyzes the level of risk in various countries and within the country. A schizophrenia risk analysis model is presented in (Bourque, F., 2011), which consider the pre and post migration factors. At last, it is identified that the post migration factors like social factors have higher impact than others.

A conceptual model is presented in (Reznik, Oleg., 2020), which monitor the labor migration and counts number of migrants at various time stamps to perform risk analysis.

A migrant risk analysis model is presented in (Kuzior, 2020), which analyze the risk faced by the migrants of Ukraine according to behavioral, cognitive and emotional features. The study has been conducted with various risk analysis model. A risk analysis model on migrant terrorists is presented in (Alex Nowrasteh, 2019), which consider the migrants with Cato policy and native-born terrorists with origin, injury and ideology.

A detailed survey on the economic impact introduced by the migration is presented in (Kerr, 2011), which consider magnitude of immigration and concomitant effect on native country. A Community Assessment and Placement (CAP) model is presented in (Robyn Sampson, 2013), which handles the unnecessary detention issues and its effects in political and policies. A Cox regression analysis model is presented in (Hollander A, 2016), which consider the psychotic disorders on immigrants according to status, age, sex, income and density of population.

However, the methods analyzed has poor performance in finding risk on migration and their support.

Real-Time Migration Risk Analysis Model with Psychological and Religious Factors

The proposed real time migration risk analysis model reads the migration trace set. The migration trace has been preprocessed to remove noisy records. Further, the method extracts the features to apply Nation centric religious support analysis and psychology support analysis. Based on the result of analysis results, the method computes the value of Migration support to perform risk analysis (Baiardi, F., 2016). Based on the result of risk analysis, an optimal nation has been selected as result for the user.

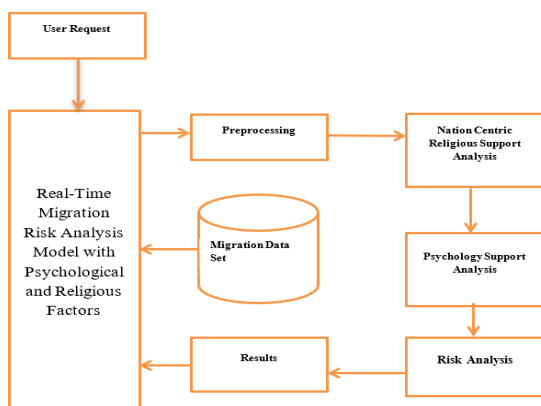


Figure 1. Architecture of RMRAM Model

The architecture of proposed RMRAM model has been presented in Figure 1, which reads the data set and analyze the risk according to the religious and psychological factors to perform risk analysis. The result of risk analysis has been used to perform migration control and discussed in detail in this section.

Preprocessing

The migration data set given has been read and identifies the set of features present in the data set. With the features identified, the method reads each trace and verifies the possession of all the features. If the trace is covered with all the features, then it has been retained with the set. Otherwise, the trace has been removed from the set. Such noise removed data set has been used to perform risk analysis.

Algorithm

Given: Migration Set Ms.

Obtain: Preprocessed migration set Pms.

Start

 Read Ms.

Initialize preprocessed migration set Pms.

$Size(Ms)$

Identify features set $Fes = Fes \cup (\sum_{i=1}^{Size(Ms)} Features(Ms(i) \ni Fes)$

For each trace T

If $T \in Features(Fes)$ then

$Pms = Pms \cup T$

Else

$Ms = Ms \cap T$

End

End

Stop

The above discussed preprocessing scheme removes the incomplete records from the set to support effective migration risk analysis.

Nation Centric Religious Support Analysis

The proposed model analyzes the religion support provided by any country to support the migration risk analysis. To perform this, the method counts the number of migrations performed in the country, counts the number of religious assaults registered, number of remigrations happened, number of positive tags provided by the migrants. Using these values, the method computes the value of National Religious support (NRS). Estimated value of NRS has been used to perform risk analysis.

Algorithm

Given: Preprocessed migration set Pms and country C.

Obtain: NRS.

Start

Read Pms and C.

Compute Number of Migration $Nm = \sum_{i=1}^{Size(Pms)} Count(Pms(i).Country == C)$

Compute no of assault registered Nar.

$Nar = \sum_{i=1}^{Size(Pms)} Count(Pms(i).Country == C \ \&\& \ Pms(i).ReligiousAssault == 1)$

Compute No of remigration registered Nrr.

$Nrr = \sum_{i=1}^{Size(Pms)} Count(Pms(i).Country == C \ \&\& \ Pms(i).Remigration == 1)$

$$\text{Compute NRS} = \frac{Nar}{Nm} \times \frac{Nrr}{Nm}$$

Stop

The above discussed algorithm analyzes the religious support provided by the country and supports risk analysis.

Psychological Support Analysis

The support of migration provided by the country affect the psychology of the migrants. To perform this, the method performs psychological support analysis by considering various psychological factors. The method computes the number of social movements given, number of social assaults faced, employment facility, health and food facility given. Using all these factors, the method computes the psychological support (PS) to support risk analysis.

Algorithm

Given: Preprocessed migration set pms, Country C

Obtain: Ps.

Start

Read Pms and C.

Size(Pms)

Compute Number of Migration Nm = $\text{Count}(Pms(i).Country == C)$
 $i = 1$

Compute No of Social Movement Nsm =

Size(Pms)

$\text{Count}(Pms(i).Country == C \ \&\& \ Pms(i).SocialMovement == yes)$
 $i = 1$

Compute no of assault faced Naf =

Size(Pms)

$\text{Count}(Pms(i).Country == C \ \&\& \ Pms(i).SocialAssault == yes)$
 $i = 1$

Compute No of Employment NoE =

Size(Pms)

$\text{Count}(Pms(i).Country == C \ \&\& \ Pms(i).Employment == yes)$
 $i = 1$

Compute Health & Food Nhf =

Size(Pms)

$\text{Count}(Pms(i).Country == C \ \&\& \ Pms(i).Food, Helath == yes)$
 $i = 1$

Compute PS = $\frac{Nsm}{Nm} \times \frac{Naf}{Nm} \times \frac{NoE}{Nm} \times \frac{Nhf}{Nm}$

Stop

The above discussed algorithm estimates the psychological support produced by any country on migration to support risk analysis.

Risk Analysis

The proposed real time migration risk analysis model (RMRAM) uses the migration data set for the analysis of risks involved and country selection. The method generates a recommendation for the user to identify a optimal country towards migration of immigrants. To analyze the risk, the method applies Nation centric religion support analysis and psychological support analysis to compute migration support (MS). Based on the value of MS, an optimal country is selected as result for the user.

Algorithm

Given: Migration set Ms, Country Set Cs

Obtain: Country C.

Start

 Read Migration set Ms and Country Set Cs.

 Pms = Preprocessing (Ms).

 For each country c

 NRS = Nation Centric Religious Support Analysis (Pms, C)

 PS = Psychological Support Analysis (Pms,C)

 Ms = NRS × Ps

 End

 Country C = Choose country with maximum Ms.

Stop

The above risk analysis model estimates the migration support for the user towards various countries and based on that an optimal nation has been selected as result.

Results and Discussion

The proposed real-time migration risk analysis model (RMRAM) model has been implemented and evaluated for its performance. The performance of the method is measured at the presence of different number of traces in the data set. Obtained results are compared with the results of other approaches.

Table 1. Experimental Details

Parameter	Value
Data set	Mexican data set
No of features	20
No of traces	1 million

The experimental setup used to evaluate the performance of proposed model is presented in Table 1. Accordingly, the performance of the method are measured and compared with the results of other approaches.

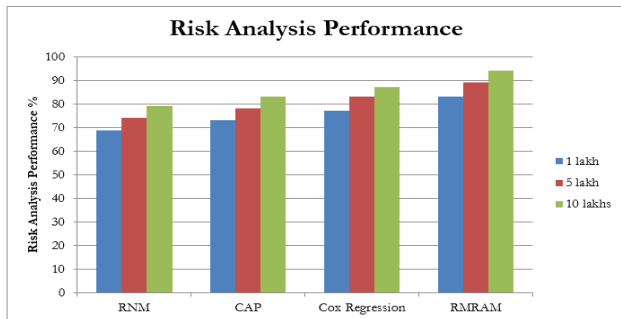


Figure 2. Migration Risk Analysis Performance

The performance of methods in analyzing the migration risk is presented in Figure 2, where the proposed RMRAM model introduces higher performance than other methods. The RMRAM model introduces higher performance up to 97%.

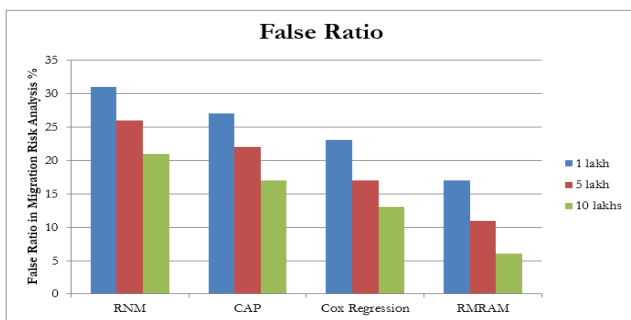


Figure 2. False Ratio in Migration Risk Analysis

The false ratio introduced by the models in migration risk analysis is measured and compared with the results of other methods in Figure 2. The proposed RMRAM model introduces less false ratio than other approaches.

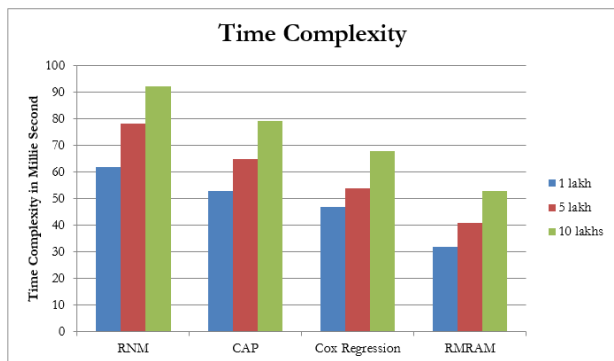


Figure 3. Analysis on Time Complexity

The time complexity introduced by different methods are measured and compared with the result of other methods. The proposed RMRAM model reduces time complexity in risk analysis than other approaches.

Conclusion

An efficient real time migration risk analysis model is presented in this article. The method preprocesses the migration trace and applies nation centric religious support analysis and psychological support analysis. Using the value of such analysis, the method computes the value of migration support by analyzing the risk. Using the value of migration support, the method identifies a optimal country for the person. The proposed RMRAM model improves the performance of migration risk analysis up to 97% with least time complexity up to 31 Millie seconds.

References

- Rosenthal T, Touyz RM, Oparil S. Migrating Populations and Health: Risk Factors for Cardiovascular Disease and Metabolic Syndrome. *Curr Hypertens Rep.* 2022 Sep;24(9):325-340. Epub 2022 Jun 15.
- Batista, C., Umblijs, J. Migration, risk attitudes, and entrepreneurship: evidence from a representative immigrant survey. *IZA J Migration* 3, 17 (2014).
- Baiardi, F., Tonelli, F., & Isoni, L. (2016). Application Vulnerabilities in Risk Assessment and Management. *Journal of Wireless Mobile Networks, Ubiquitous Computing, and Dependable Applications*, 7(2), 41-59.
- Deole, S. S., & Rieger, M. O. (2023). The immigrant-native gap in risk and time preferences in Germany: levels, socio-economic determinants, and recent changes. *Journal of Population Economics*, 36(2), 743-778.
- Ahmet Coskun Acik, Risk governance approach to migration: a viable alternative to precautionary management, *Journal of Risk Research*, Volume 25, 2022 - Issue 4.
- Manji, K., Perera, S., Hanefeld, J. *et al.* An analysis of migration and implications for health in government policy of South Africa. *Int J Equity Health* 22, 82 (2023).
- Scott Rodilitz, Edward H. Kaplan, *Snapshot Models of Undocumented Immigration*, Wiley Online Library, Volume41, Issue9, September 2021, Pages 1643-1661.
- Dekkers, T., van der Woude, M., & Koulish, R. (2019). Objectivity and accountability in migration control using risk assessment tools. *European Journal of Criminology*, 16(2), 237–254.
- Huber, P., Nowotny, K. Risk aversion and the willingness to migrate in 30 transition countries. *J Popul Econ* 33, 1463–1498 (2020).
- Eckhart, M., Brenner, B., Ekelhart, A., & Weippl, E. (2019). Quantitative Security Risk Assessment for Industrial Control Systems: Research Opportunities and Challenges. *Journal of Internet Services and Information Security*, 9(3), 52-73.
- Bourque, F., Van der Ven, E., & Malla, A. (2011). A meta-analysis of the risk for psychotic disorders among first- and second-generation immigrants. *Psychological Medicine*, 41(5), 897-910.
- Reznik, Oleg & Muzychuk, Oleksandr & Yunin, Oleksandr & Kaliuzhna, Svetlana & Dubenko, Oleksandr. (2020). Migration risk management as a factor of national security. *Journal of Security and Sustainability Issues*.
- Kuzior, Aleksandra, Anna Liakisheva, Iryna Denysiuk, Halyna Oliinyk, and Liudmyla Honchar. 2020. "Social Risks of International Labour Migration in the Context of Global Challenges" *Journal of Risk and Financial Management* 13, no. 9: 197.

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Alex Nowrasteh, Terrorists by Immigration Status and Nationality: A Risk Analysis, 1975–2017, Policy Analysis, No. 866, 2019.

Kerr, Sari Pekkala and Kerr, William R., Economic Impacts of Immigration: A Survey (January 2011). NBER Working Paper No. w16736, Available at SSRN: <https://ssrn.com/abstract=1749895>.

Robyn Sampson, Grant Mitchell, Global Trends in Immigration Detention and Alternatives to Detention: Practical, Political and Symbolic Rationales, *Journal of Migration and Human Society*, Volume 1 Number 3 (2013): 97-121.

Hollander A, Dal H, Lewis G, Magnusson C, Kirkbride J B, Dalman C et al. Refugee migration and risk of schizophrenia and other non-affective psychoses: cohort study of 1.3 million people in Sweden *BMJ* 2016; 352: i1030.