

ANALYSIS OF FACTORS AFFECTING PERMANENT RESIDENCY USING DATA AND PREDICTIVE ANALYTICS

A Senior Project submitted to
the Faculty of California Polytechnic State University
San Luis Obispo

In Partial Fulfillment
of the Requirements for the Degree of
Bachelor of Science in Industrial and Manufacturing Engineering

by
Katrina Apiado, Industrial Engineering
Mahek Karamchandani, Manufacturing Engineering
Nika Mahdavi, Industrial Engineering
Boaz Nakhimovsky, Industrial Engineering

December 2023

ABSTRACT

Immigration Backlog Analysis

Katrina Apiado, Mahek Karamchandani, Nika Mahdavi, Boaz Nakhimovsky

The United States immigration system is facing a significant backlog, with over 1.3 million pending cases as of 2021 (New York Times, 2023). With the growing number of applications for a green card and the impact of the COVID-19 pandemic, there is a nearly decade-long backlog of green card applicants, affecting the livelihoods of families on the brink of deportation. The backlog has resulted in prolonged wait times for individuals seeking visas or green cards, as well as increased processing times for asylum seekers and refugees, leaving many individuals stuck in limbo without access to critical services. Urgent action from policymakers is needed to address this pressing issue. However, providing information on historical wait time may decrease the stress for applicants. Applicants are subject to many factors at various stages of approval, such as level of income, education, and accessibility to green card resources. To address these issues, this project creates a website dashboard that would be easily accessible to anyone aspiring for permanent residency in the United States. Our proposed solution to address the challenges faced by individuals seeking permanent residency in the United States is a user-friendly website interface developed using Streamlit, a Python-based library specifically designed for creating interactive web applications. The interface comprises two key features: a descriptive analytics page and a predictive analytics page. The descriptive analytics page presents trends and insights derived from immigration data through visual representations, empowering applicants to make informed decisions and manage their expectations. The predictive analytics page allows users to input their data and receive personalized estimates of their immigration process duration. By incorporating

various graphical representations like scatter and bar plots, the interface provides industry-specific insights and a comprehensive understanding of the applicant pool. With a tab-based system, users can navigate and focus on specific aspects of interest, facilitating a streamlined user experience. Through the implementation of a Random Forest model and evaluation using the F1-Macro score, our platform demonstrates precision and recall in predicting immigration outcomes. In parallel, preliminary testing with individuals who have undergone the immigration process provides early feedback on the relevance and helpfulness of our descriptive analytics user interface. Together, these results signify a diligent and iterative approach to refining our platform for optimal user utility and impact. This strategic combination ensures reliability and precision in the predictions generated for users, as our aim is to empower applicants with valuable insights to navigate the complex immigration system more efficiently.

ACKNOWLEDGEMENTS

We would like to thank Dr. Puneet Agarwal, our mentor and advisor, for his guidance and support throughout the project.

Table of Contents

Introduction and Background	7
Current State	10
Literature Review.....	13
1 Immigration Process in the US	13
1.2 Different Pathways for Immigration.....	13
1.3 Visa Issues pertaining to Green Card Backlog	15
1.4 Layoffs Affecting Green Card Backlog.....	16
2 Problems and Issues Related to Immigration Process	17
2.1 Psychological Impacts of Immigration	18
2.2 Ethics of Immigration	19
2.3 Religious Inequality in Immigration Process.....	20
2.4 Country of Origin Inequity	21
2.5 Employment Inequity.....	22
2.6 Education Inequity	23
2.7 Employment Location Inequity	24
2.8 Impact of COVID-19 Pandemic on Immigrant Population	25
3 Immigration-Related Research Methods	26
3.1 Life Expectancy vs Health Coverage and Services	29
3.2 Existing Solutions for Immigrants with Mental Health.....	29
3.3 Possession of Fundamental Rights for Immigrants	30
3.4 Quantitative Research	31
3.6 Research of Pandemic Effect on Green Card Backlog	32
4 Currently Available Online Tools.....	34
Solution Design.....	35
Verification of Design Solution	44
Conclusion	44
Future Directions	45

List of Figures

Figure 1: Immigration Process Flow Chart.....	11
Figure 2: Potential Factors on Immigration Process.....	12
Figure 3: Immigration Preference Categories and Quotas (Immigration and Nationality Act sections 201 and 203).....	15
Figure 4: Publications Written About United States Immigration.....	27
Figure 5: Major Concepts from Publications on U.S. Immigration.....	28
Figure 6: Average Immigration Wait Time	31
Figure 7: COVID-19 Pandemic Effect on Green Card Totals.....	33
Figure 8: Average Waiting Time per Employee Salary.....	36
Figure 9: Average Waiting Time per Education Level.....	36
Figure 10: Average Waiting Time per Work State	37
Figure 11: Number of Cases per Nationality	38
Figure 12: Predictive Dashboard User Form	39
Figure 13: Random Forest Model	40
Figure 14: Model Feature Importance Plot.....	41
Figure 15: User Interface Home Page.....	42

Introduction and Background

This project explores various topics related to the U.S. immigration backlog issue and aims to provide valuable information to individuals navigating the system. While it does not directly alleviate the immigration backlog, the insights offered empower users to make informed decisions, potentially mitigating stress and challenges associated with the immigration process. The paper begins with an introduction and background section, providing an overview of the problem. The current state of the immigration backlog is then examined, followed by a comprehensive literature review. The literature review explores the immigration process in the US, different pathways for immigration, visa issues related to the green card backlog, and the impact of layoffs in the workforce on the backlog. The subsequent section delves into the problems and issues associated with the immigration process, including psychological impacts, ethics, religious inequality, country of origin inequity, employment and education inequity, and the impact of the COVID-19 pandemic. The research methods section explores various approaches used in immigration-related research, such as studying life expectancy vs health coverage, existing solutions for immigrants' mental health, and the fundamental rights of immigrants. It also covers quantitative research and the research conducted on the pandemic's effect on the green card backlog. The currently available online tools for immigration are examined, and the next steps are discussed. The proposed solution design section outlines the development of a website dashboard with descriptive and predictive analytics features. The validation and verification of the design solution are then addressed. Finally, the conclusion summarizes the key findings and highlights the importance of this research in addressing the inequities and challenges faced by individuals in the immigration process.

Problem Definition

The current United States immigration system faces a critical problem with the backlog of applications, which has caused significant delays in the processing of immigration requests. In addition, the individual's times to processing vary greatly. The variety of different factors that can influence one's immigration timeline includes various case complexities. These complexities stem from changes in immigration policies, such as the impact of the COVID-19 pandemic on visa processing times, which has resulted in further delays in application processing. In addition, there is a considerable discrepancy in the application processing times for individuals from different countries, with some experiencing much longer waiting periods than others, resulting in significant inequities in the immigration process. Furthermore, individual case complexities, such as the need for additional documentation, medical examinations, or interviews, can cause further delays in the processing of immigration applications. All these factors contribute to the backlog of immigration applications, creating an urgent need for transparency and predictability in the immigration process to reduce the associated uncertainty and frustration for applicants.

To tackle these concerns, our plan is to establish a user-friendly website dashboard, which can be effortlessly accessed by anyone who wishes to investigate permanent residency in the United States. The proposed dashboard will comprise two distinctive features: a descriptive analytics section, which will present crucial insights derived from immigration data via visually appealing charts and graphs, and a predictive analytics section that will allow users to enter their personal information and then receive a projected timeframe for their immigration process. By presenting vital trends and patterns through a descriptive analytics page, the dashboard will increase transparency in the immigration process, helping applicants to understand the status of their application. Moreover, the predictive analytics section will enable applicants to input their

specific information to determine the expected duration of their immigration process, accounting for individual case complexities, such as changes in immigration policies, volume of applications, and personal circumstances. By providing applicants with greater transparency and predictability, the proposed dashboard aims to reduce the uncertainty and frustration associated with the current immigration process, thereby taking a data-driven step towards increasing efficiency and fairness in the United States immigration system. These tools will be developed based on analysis of data available from the USCIS database (Permanent Labor Certifications (PERM) Database for Green Card filed with US Dept. of Labor).

The project's success in addressing the United States immigration backlog has been measured through various metrics. Initially, we developed a user-friendly website dashboard, offering essential insights into the immigration process and predicting personalized timelines for applicants. In assessing the dashboard's user-friendliness, interested parties were allowed to use it, and their feedback was collected. The time taken to obtain results and any errors in the process were recorded during this phase. Subsequently, adjustments were made based on user feedback to enhance convenience and user-friendliness. The impact of the dashboard was evaluated by monitoring the number of users accessing it and assessing its effectiveness in clarifying immigration status. The overarching achievement is in facilitating easier access to information, fostering transparency, and alleviating uncertainty and frustration within the immigration process for immigrants.

It is important to note that this project on the United States immigration backlog is constrained by the data available to us. Some data sources have only collected information for a short period of time, which may lead to unreliable trends or predictions. Additionally, while we strive to make the best possible predictions using our predictive analytics dashboard, the

immigration process in the United States is multi-faceted and extremely nuanced, dependent on a wide range of factors. Therefore, there are inherent limitations to the accuracy of our predictions. Nevertheless, we believe that our dashboard can still provide valuable insights and transparency to applicants seeking permanent residency in the United States, and with our current framework, we have increased efficiency for anyone looking to continue this project to refine and improve our methodology with more data and feedback.

Current State

The current state of the application process resulting in an immigration backlog is complex and lengthy (see Figure 1). Limited visas, increasing applicants and a complicated process all contribute to the backlog. There is an annual cap on the number of employment-based visas at 140,000, which is alongside a high volume of applicants in the backlog, especially in the skilled worker category. Currently, the time-consuming application process consists of labor certification, filing a petition with the United States Citizenship and Immigration Services, and completing an interview at a U.S. embassy. To address the backlog, the USCIS increased staff. The Biden administration proposed increasing the number of visas and simplifying the process. The government filing fee for a family-based green card is \$1200 for an applicant living outside the United States. For EB-1 Green Card, extraordinary ability, the costs are \$2470 (\$700 for I-140, \$1140 for I-485, \$325 for Immigrant Visa Application, \$85 for Biometrics and \$220 for USCIS Immigrant Fee). For EB-2, the current costs are about \$7970-\$8970 (\$3000-\$4000 for labor certification, \$700 for I-140, \$1140 for I-485, \$325 for Immigrant Visa Application \$85 for Biometrics, \$220 for USCIS Immigrant Fee and \$2500 for I-907). EB-3 (Professionals) Costs are the same as EB-2.

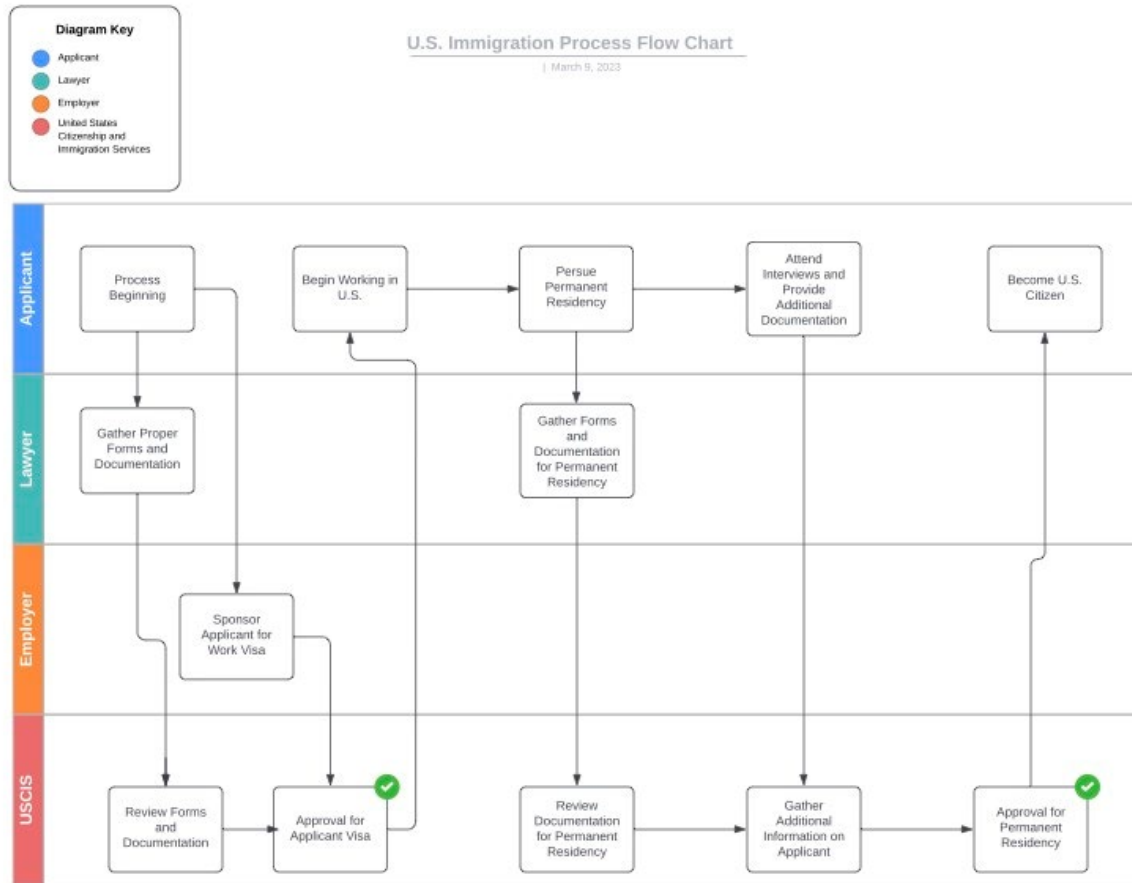


Figure 1: Immigration Process Flow Chart

There are many key potential players involved in the immigration process, including the applicant, their lawyer, the employer, and the United States Citizenship and Immigration Services (USCIS). In some cases, the employer may sponsor the applicant for a work visa. While an applicant can gather paperwork on their own, it may be necessary to work closely with a lawyer to ensure the gathering of proper forms and documentation. Once all the necessary paperwork is submitted, the USCIS will review the forms and may even gather additional information through interviews to ensure that the applicant meets all the necessary requirements. Ultimately, the USCIS will make the final decision on whether to approve the applicant's immigration request. With so

many steps and parties involved, it's important to have a clear understanding of the entire process to ensure a successful outcome.

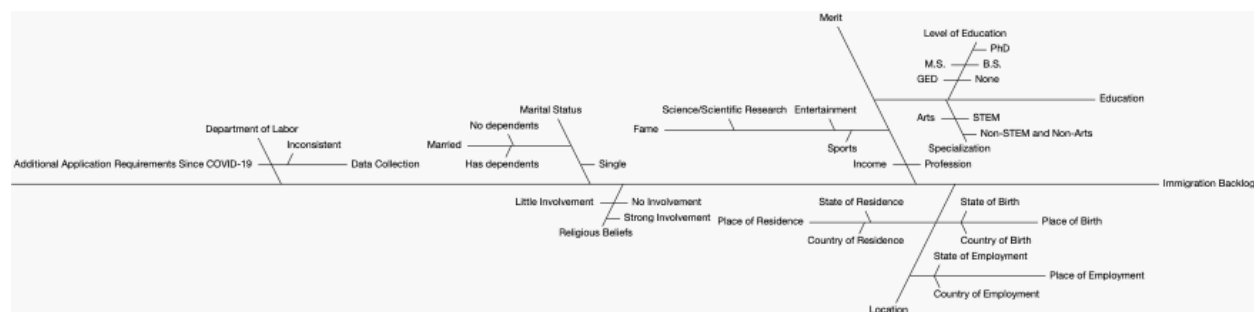


Figure 2: Potential Factors on Immigration Process

When it comes to obtaining permanent residency status in the United States, there are various factors that can influence an applicant's success (Figure 2). One of the most important factors is meeting the eligibility requirements for the specific visa category or program that the applicant is applying for. For example, certain visas may require a minimum level of education or work experience, while others may have specific requirements related to family relationships or investment in the United States.

The immigration process in the United States can be a complex and lengthy undertaking that involves meeting eligibility requirements, completing various forms, providing documentation, and undergoing background checks and interviews. Applicants may also face delays and challenges related to their education level, marital status, changes to immigration policies or regulations, and many more. The process can often take several years to complete, and the backlog of applications for certain visa categories can further lengthen the timeline. Given the complexity of the process, it's important for applicants to seek guidance and clarity to navigate the system and increase their chances of success.

Literature Review

The literature review section examines existing studies and scholarly articles to explore the immigration backlog and related issues. It covers pathways for immigration, green card backlog, layoffs, psychological impacts, ethical considerations, religious inequality, country of origin inequity, employment and education inequity, and the pandemic's impact.

1 Immigration Process in the US

The immigration process in the US can be complex and lengthy. The first step for most people is to obtain a visa, which can take several months or even years depending on the type of visa and the applicant's individual circumstances. Once in the US, immigrants may need to apply for a green card or permanent residency, which can also take a considerable amount of time. The process involves submitting various forms and documentation, undergoing background checks, and attending interviews. There are also several categories of visas and different paths to citizenship, which can be confusing for those unfamiliar with the system. It is important for immigrants to seek out accurate information and legal assistance to navigate the process successfully.

1.2 Different Pathways for Immigration

The EB-1 visa is an employment-based visa and is meant for individuals who possess extraordinary ability in their field, such as science, arts, education, business, or athletics, as well as for outstanding professors or researchers, and multinational executives and managers (VisaGuide.world,2023). The website explains the eligibility criteria and highlights the different evidentiary requirements for each subcategory of the EB-1 visa. For instance, national or international awards, media coverage, and significant contributions to the field could be required

(VisaGuide.world,2023). It is also important to provide detailed evidence to support the claims made in the application; reference letters, contracts, and patents can be used as evidence. (VisaGuide.world,2023).

The USCIS website emphasizes the importance of providing convincing evidence to support an application for an EB-1 visa, noting that the burden of proof rests on the applicant to demonstrate eligibility for the visa category (USCIS,2022). Overall, the USCIS website and VisaGuide website both provide a helpful resource for those seeking to understand the requirements and evidentiary standards for the EB-1 visa category.

The EB-1A Green Card is a subcategory of the EB-1 Employment-Based Green Card. It is for extraordinary ability, which only qualifies a small percentage who have risen to the very top of their field of endeavor. An example of evidence an EB-1A recipient with international acknowledgement may have would be the Nobel peace prize. EB-1A requirements are similar to those of the O-1 Visa. (VisaNation, 2023).

The United States Citizenship and Immigration Services (USCIS) website outlines the requirements and process for obtaining employment-based immigration through the EB-2 category. This category is reserved for professionals holding advanced degrees or those with exceptional abilities in their field (USCIS,2022).

To qualify, there must be a job offer from a US employer, and they could be applying as a professional with an advanced degree or as an individual with exceptional abilities in their field. The process for obtaining EB-2 employment-based immigration includes filing a petition, obtaining a labor certification from the Department of Labor, and attending an interview (USCIS,2022). Prior to petitioning for this type of visa, the sponsor - usually the employer- needs to apply for a permanent employment (PERM) certification through the department of labor, using

form 9089. This may be bypassed by petitioning for a national interest waiver. The cost for filing Form I-140 is \$700, this fee is to be paid by the sponsor, following the approval of the I-140, and the applicant will continue paying green card fees. EB-2 Processing times can be from 10 months to 2 years for US Citizenship and Immigration Services (USCIS) to process Form I-140. Then the applicant must wait for a visa to become available, this is the wait time which varies greatly (Boundless Immigration, 2017).

Employment preferences	All employment preferences	140,000	9,800
	EB1: Priority workers	40,040	2,803
	EB2: Advanced degree or exceptional	40,040	2,803
	EB3: Bachelor's degree or professional	35,040 (2)	2,453
	EB30: Other unskilled workers	5,000 (2)	350
	EB4: Special immigrants	9,940	696
	EB5: Investors (employment creation)	9,940	696

Figure 3: Immigration Preference Categories and Quotas (Immigration and Nationality Act sections 201 and 203)

The preference categories are immigration lines with quotas and waiting lists accounting for one-third of all permanent immigration to the US as seen in Figure 3. The preference system prioritizes applicants based on different family and employment preferences, and the law limits the number of green cards any single nationality can receive to 7% of the total, plus any unused green cards given out on a first-come, first-served basis in a particular category.

1.3 Visa Issues pertaining to Green Card Backlog

Securing an employment-based green card can free recipients from the restrictions of temporary work visas, which are tied to sponsorship by an employer. With a green card, recipients can more easily change jobs and seek promotions that match their skills, similar to US citizens. With the benefits of obtaining a green card, including the ability to reside permanently in the US

and pursue career opportunities without being tied to an employer. Those per-country caps create particularly long wait times for applicants from India and China, the biggest sources of high-skilled immigrants on H-1B temporary work visas. However, the current backlog of approved applicants, particularly those from India and China, can leave them waiting for years or even decades on temporary visas. Immigration advocates and lawmakers have tried to address the issue of reducing wait times, but there has been no agreement on how to tackle the problem, even among groups that support more employment-based immigration. (Kreighbaum, 2022).

The Covid-19 pandemic has led to an increase in the number of employment-based visas available, but it has not made a significant dent in the backlog. Additionally, children of immigrant workers face removal from the US when they turn 21 and age out of dependent status, which is another issue within the broader context of visa issues in the Green card process. As mentioned on the US government website “The Diversity Immigrant Visa (DV) Program allows for up to 55,000 immigrant visas to be awarded each year. Foreign nationals of countries with low rates of immigration to the U.S. can participate in a random drawing for the potential of getting an immigrant visa” (USAGov. (n.d.)). Reducing wait times is a key priority for immigration advocates, and lawmakers in both chambers of Congress continuously have tried—and failed—to address the issue. But even groups that support more employment-based immigration, and not just immigration restrictionists, haven’t been able to agree on how best to address the issue. (Kreighbaum, 2022)

1.4 Layoffs Affecting Green Card Backlog

With the potential negative impact of green card backlogs and uncertainty regarding long-term status on attracting talented workers to immigrate to the US, which could have an adverse effect on the foreign talent pipeline. Amazon and Google, as prominent employers, have urged for

the reduction of green card backlogs to alleviate lengthy wait times and attract more skilled workers. Despite other attempts to attract international talent, these have not been fruitful, and the tech industry layoffs further emphasized the detrimental consequences of green card backlogs (Depillis, 2023). As mentioned in the Bloomberg Law, “A recent wave of layoffs in the tech industry, among the biggest fields employing workers on H-1B visas, highlighted the negative effects of green card backlogs. The sudden job losses meant many workers who have lived in the US for years would be forced to find new H-1B visa sponsors within 60 days or face removal from the US, even if they’ve started the process of applying for a green card” (Kreighbaum, 2022). Overall, the situation is particularly challenging for Indian and Chinese workers who remain on extended H-1B visas while waiting for green cards due to per-country caps on permanent, employment-based visas. This leads to these workers forming strong roots in the US and experiencing difficulties when layoffs occur. (Kishinami, 2023).

2 Problems and Issues Related to Immigration Process

The immigration process in the United States can be a complex and challenging experience for many individuals and families. While the United States has a long history of welcoming immigrants, the current immigration system is fraught with a range of issues, including bureaucratic delays, inadequate resources, and systemic biases. In this section, we will explore some of the key issues related to the immigration process in the United States, including the challenges faced by immigrants seeking to enter the country, the policies and procedures that govern the immigration process, and the impact of immigration on U.S. society as a whole.

2.1 Psychological Impacts of Immigration

The current political climate in the United States is marked by anti-immigrant sentiment, resulting in xenophobia and discrimination. Discriminatory attitudes in the United States often prevent immigrants from securing jobs that are appropriate to their qualifications and experiences. Immigrants may be forced to settle for multiple “blue-collar” jobs in addition to attending school, leading to financial and psychological stress. A participant in a psychological study by Dr. Chukwudi C. Ekwemalor and Dr. Ifeoma E. Ezeobele shared, "It took me 6 months to get a menial job. It really became very tough very soon" (Ekwemalor, 2020).

Additionally, the distance between countries and the difficulties faced by immigrants makes the U.S. a lonely place. The participants reported that they were experiencing stressful problems through the immigration process but felt isolated as they were unable to find help. The American Psychiatric Organization reported that immigrants are “more likely to have multiple psychosocial problems but use fewer mental health services” (American Psychiatric Association, 2012). It is worse for those with children, as their lives revolve around their immigration status, daycare, and school activities that must be balanced with jobs. One female participant in the study expressed feeling lonely and nostalgic, saying "We felt lonely. We became nostalgic and longed for the friends, families, and camaraderie in Nigeria". These experiences are catalysts for mental health hindrances, as immigration-related stressors can “increase suicidal ideation and risk due to cultural stress, social marginalization, intergenerational conflicts, PTSD, and other psychological disorders” (American Psychiatric Association, 2023).

Overall, the challenges faced by immigrants can have a significant impact on their mental health. Efforts to address the root causes of these stressors, such as racism, discrimination, and

lack of resources, are essential in promoting the mental health and well-being of U.S. immigration applicants.

2.2 Ethics of Immigration

The central question of immigration ethics concerns whether states should restrict immigration or open their borders and what values should be used to make this determination. Additionally, once immigrants have entered a state, what rights and privileges should they have? Jonathan Kwan, a professor at Santa Clara University, notes that different classes of immigrants, such as refugees or economic migrants, raise distinct ethical issues and demands. Dr. Kwan concludes that immigration ethics is subject to open-ended inquiry and often involves conflicts between moral values and principles, challenging us to rethink our philosophical theories and normative commitments. Kwan writes, "Regardless of whichever problems are considered within its purview, immigration ethics often involves conflicts between our moral values and principles...and challenges us to rethink our philosophical theories and normative commitments themselves" (Kwan, 2021).

In Alex Sackey-Ansah's journal, *Transformation: An International Journal of Holistic Mission Studies*, he groups immigration ethics into two categories: morality and jurisdictions. The former includes discussions of ethics and morality, while the latter is concerned with state jurisdiction and rights. The theoretical approach used is situation ethics, which states that judgments are based on the situation, and deontology and consequentialism, which look at moral conduct and the effects of policies, respectively. All in all, Sackey-Ansah argues that depending on how a government views immigration— in a moral or jurisdictional way— dictates the ease of immigration for an applicant. In his opinion, America is run with a jurisdictional perspective, as it

“only permits the entry of immigrants on justifiable grounds” (Sackey-Ansah, 2023). As a result, philosophy professor, Andy Lamey, argues “that a widespread feature of contemporary [American] immigration policy is to prioritize the entry of well-off, economically skilled immigrants over their unskilled, impoverished counterparts” (Lamey, 2016).

2.3 Religious Inequality in Immigration Process

Religion is a crucial factor in understanding the determinants of immigration attitudes. A study by University of Iowa professor Benjamin K. Knoll examines three theoretical frameworks through which religion may impact attitudes towards immigration: ethnoreligious, religious structuralism, and minority marginalization. The study concludes that religion is a significant independent variable in determining attitudes toward immigration policy. It also suggests that future research in this area should consider controlling for religious variables when studying public opinion on immigration. The authors suggest that the effect of religion on public policy preferences is comparable to other traditional determinants of attitudes, such as socioeconomic status. One of the implications of this study is that religion should be included among the determinants of attitudes toward immigration policy. The study concludes by noting that "it is not unreasonable to conclude that documented immigrants who attend religious organizations that support liberal immigration policies may be more likely to support such policies" (Knoll, 2009). Although religion in the United States has affected immigration reform, it is overwhelmingly evident that the Christian faith is favored in the immigration process.

One example of religious inequality in the U.S. immigration process is the exclusion of Muslim immigrants in the United States, which predates the Trump administration's "Muslim Ban." An article titled, *The Muslim Ban Exposes the Racialization of Religion in America*, in the

University of California Press traces the origins of this exclusion to the early 1900s, when scientific racism labeled people from the Middle East and North Africa as "Mohametan Turks" and deemed them an inferior race. As a result, Muslims were legally classified as "Asiatic" and ineligible for citizenship. The author argues that America's history of religious and racial exclusion undermines its commitment to religious freedom and poses a challenge to building a truly inclusive society. The article concludes by noting, "But just like immigration exclusion, religious freedom has always been racially circumscribed in a country founded by Anglo-Saxon Protestants whose notion of Manifest Destiny was theologically based" (Aziz, 2022).

2.4 Country of Origin Inequity

In 2018, there were around 11.2 million immigrants living in the U.S. from Mexico, which accounted for 25% of all U.S. immigrants. The next largest origin groups were from China, India, the Philippines, and El Salvador. Immigrants from Asia combined accounted for 28% of all immigrants, while immigrants from Europe, Canada, and other North America accounted for 13%. The Caribbean accounted for 10%, Central America for 8%, South America for 7%, the Middle East and North Africa for 4%, and sub-Saharan Africa for 5% (Budiman, 2022).

The demand for visas to the United States is high, resulting in significant backlogs for many family members and workers hoping to enter the country legally. The number of permanent immigrants from a single country cannot exceed seven percent of the total number of people immigrating to the United States in a single fiscal year, this results in "people from countries with high levels of immigration to the United States—Mexico, China, India, and the Philippines—generally have the longest waiting times for immigrant visas" (American Immigration Council, 2021). The Diversity Visa Program is another legal path for people who do not qualify under the

family, employment, or humanitarian systems. However, this program is only available to persons from countries with low rates of immigration to the United States, and the chances of obtaining a visa through the lottery are extremely low.

The National Intelligence Council expects an increase in the number of international migrants due to “rising incomes [that] will provide more people with the means to seek better lives abroad” (Global Trends, 2021). The United States is likely to remain the preferred destination for migrants due to its high quality of life and economic opportunities. In addition, migratory flows are mostly intraregional, with many African migrants residing in other African countries. The NIC also notes that rising incomes in developing countries such as Bangladesh, India, Nigeria, and the Philippines will likely lead to increased emigration rates from the US (?).

2.5 Employment Inequity

There is a debate around highly skilled immigrant workers in the U.S. economy, and how temporary foreign workers are paid a lower wage due to restricted mobility while on a temporary visa. Using data from the New Immigrant Survey, the study *The Value of An Employment-Based Green Card* estimates the wage gain for employment-based immigrants acquiring permanent U.S. residency. The study finds that for employer-sponsored immigrants, acquiring a green card “leads to an annual wage gain of about \$11,860” (Mukhopadhyay & Oxburrow, 2011).

Temporary immigrant workers should receive the same wage as an equivalent native worker. However, immigration rules create labor market friction that prevents temporary workers from earning the same wage as natives and permanent residents. The two potential sources of friction are the direct cost of legal and processing fees and the restricted mobility among immigrants during the period between applying for permanent residency and receiving permanent

residency. This means employers may underpay their foreign workers due to immigrants' limited mobility. Although employers are legally required to pay the "prevailing wage" to H-1B employees, loopholes may cause employers to underpay their immigrant workforce. A study by Gass-Kandilov (2007) found that immigrants experienced a wage gain of 18%–25% between their first job in the United States and their current job after receiving a green card.

There are multiple difficulties faced by immigrants who are waiting to become permanent residents. For immigrant workers who are waiting for permanent residency, "they are unable to change jobs without losing their position in the visa queue or, in many cases, even to accept a promotion... without losing their position in the visa queue" (Mukhopadhyay & Oxburrow, 2011). This situation may lead to employers underpaying immigrant workers due to their limited mobility. The restrictive nature of the application procedure may lead employers to underpay their foreign workers due to their limited mobility. As Hamm and Herbst argue, "existing loopholes may cause employers to underpay their immigrant workforce" despite legal requirements to pay the prevailing wage to H-1B employees. However, the extent to which wages factor into employment decisions is not clear, as the study conducted by the U.S. General Accounting Office reports. Furthermore, L-1 visas do not require employers to pay the prevailing wage to workers, further exacerbating the situation for immigrant workers.

2.6 Education Inequity

Wait times vary drastically among green card applicants across all levels of education. For doctoral degrees, in which many immigrants choose to pursue higher education in the U.S. with hopes of permanent residency. Reducing wait times for permanent residency could help to retain

more of these highly skilled individuals, which could have significant economic benefits for the U.S. and the countries of origin of these doctoral recipients.

Using data from the Survey of Earned Doctorates (SED), the Survey of Doctoral Recipients (SDR), and the U.S. Citizenship and Immigration Services (USCIS), the study *Wait Time for Permanent Residency and the Retention of Immigrant Doctoral Recipients in the U.S.* evaluates the impact of wait times for permanent residency on the migration decisions of foreign-born doctoral recipients graduating from U.S. universities. As noted, "Current (as of January 2016) predicted wait times for graduates from India and China are 10 and 6 years, respectively" (Khosla, 2017). This can have a significant impact on the retention of Ph.D. recipients from these countries. The study's results indicate that "an additional year of wait time decreases the probability of retention of fresh immigrant doctoral recipients (0–2 years after graduation) by 5.5 percentage points" (Khosla, 2017). However, the impact of wait time on retention is temporary and diminishes over time. For immigrant doctoral recipients 3 to 5 years after graduation, the impact decreases to 1.2 percentage points. For immigrants at least 6 years since graduation, there is no effect of wait time on immigrant retention in the U.S.

2.7 Employment Location Inequity

The immigrant population in the US is becoming more diverse, as people are coming from all over the world causing the immigrant population to grow by 11.3 million during the 1990s, which is faster than any other time in history, according to the Center for Immigration Studies. Researchers have studied the impact of immigrants on the host country, with some concluding that immigrants have a large adverse impact on the wages and unemployment opportunities of the native-born population (Chuong, 2006). However, evidence of this is not significant, and job

opportunities and economic conditions play a more critical role in people's choice to move. Recent immigrants tend to locate in areas with a “higher presence of earlier immigrants” (Chuong, 2006), and “education plays a key role in location choices” (Bartel, 1989). Different ethnicity groups tend to cluster in certain areas because of the number of similar foreign-born populations, and the friends and family effect is important. Immigrant location patterns are determined by the similar ethnic population that resides in the area. The U.S. Census Bureau provides key information about the people living in the US, and the U.S. Immigration and Naturalization Service measures the initial choice of resettlement. Immigrant location choices appear to be sensitive to welfare generosity, and new refugees tend to settle in states that offer higher AFDC and food stamp benefits, such as California and Texas.

2.8 Impact of COVID-19 Pandemic on Immigrant Population

According to the report *U.S. Unemployment Trends by Nativity, Gender, Industry, & More, Before and During Pandemic*, immigrant communities are particularly vulnerable to unemployment and financial strain due to the COVID-19 pandemic. Immigrant women have seen a rise in unemployment from 4.3% to 18%, while for US-born women, it changed from 3.3% to 15.3% (Migration Policy Institute, 2023). Undocumented immigrants are ineligible for national unemployment benefits, and job loss due to the pandemic may lead to significantly decreased financial reserves in immigrant households. This, combined with a higher number of uninsured immigrants and those working in high SARS-CoV-2 exposure risk jobs, may result in increased COVID-19–related morbidity and mortality in immigrant communities. Additionally, many parents have limited childcare options due to extended school closings, putting additional financial, health, and social pressure on families.

The COVID-19 pandemic has caused concerns about global food insecurity, especially in disadvantaged communities such as immigrants. Immigrants who have resided in the US for less than 5 years are particularly vulnerable due to language barriers and limited exposure to education and jobs, while even those who have lived in the US for over 10 years are at a higher risk of food insecurity than US-born households (Chilton et al., 2011). Eligibility for Supplemental Nutrition Assistance Program (SNAP) is limited for some immigrants, and despite eligibility, low-income US citizen children with immigrant parents have reduced utilization of this benefit. Furthermore, the “Public Charge” rule implemented in 2020 limits the ability of immigrants to adjust to legal permanent resident status if they have used certain public benefits, leading many families to forgo participation in all federal assistance programs. This may prevent many eligible immigrant families from applying for the Pandemic Electronic Benefit Transfer, which is available to children regardless of immigration status. The limited transportation options and restaurant restrictions, reduced grocery store supply, and diminished resources in food banks may further limit food availability in at-risk immigrant communities.

3 Immigration-Related Research Methods

The section on immigration-related research methods explores approaches like life expectancy vs health coverage, mental health solutions for immigrants, fundamental rights, quantitative research, and the pandemic's impact on the green card backlog. By examining these methods, we aim to enhance our understanding of immigration challenges, identify gaps in knowledge, and contribute to the development of effective solutions. This section provides a crucial foundation for informing the design and implementation of strategies to address these issues.

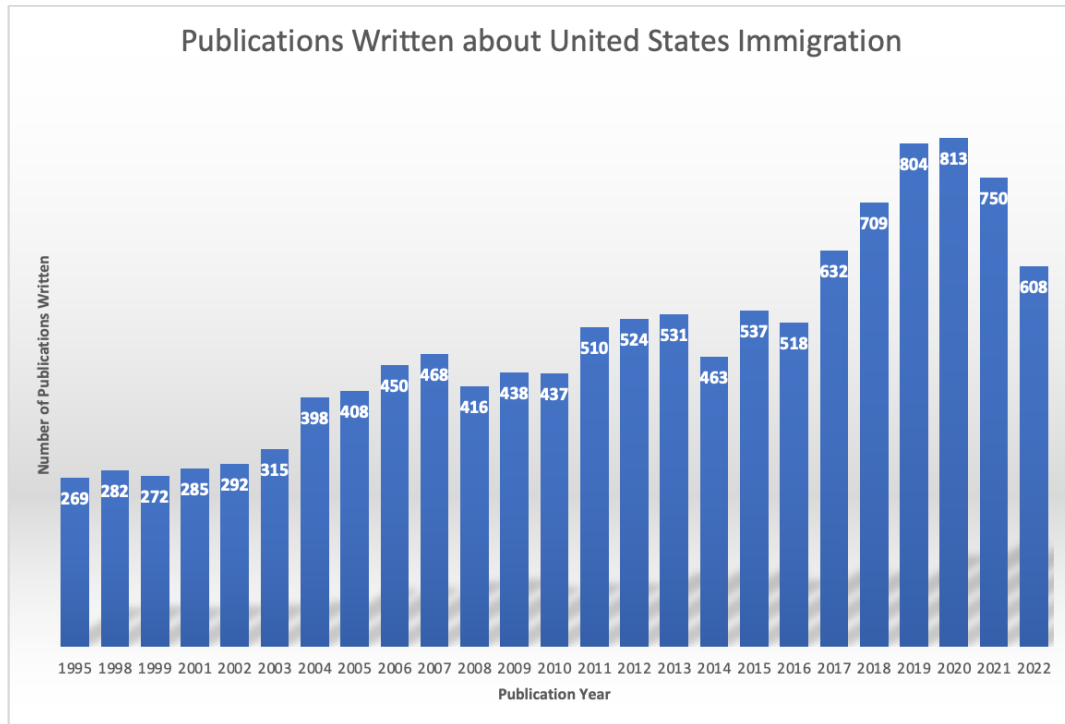


Figure 4: Publications Written About United States Immigration

The figure 4 above displays the trend of research papers published on Immigration to the United States using the *Web of Science* database (date). The results shown above are from publications that match the search phrase: “United States Immigration”. Over the last 25 years, it is evident that U.S. immigration has become a popular topic to address in the research community. It is logical to conclude that the immigration process has become a more pressing issue over time.

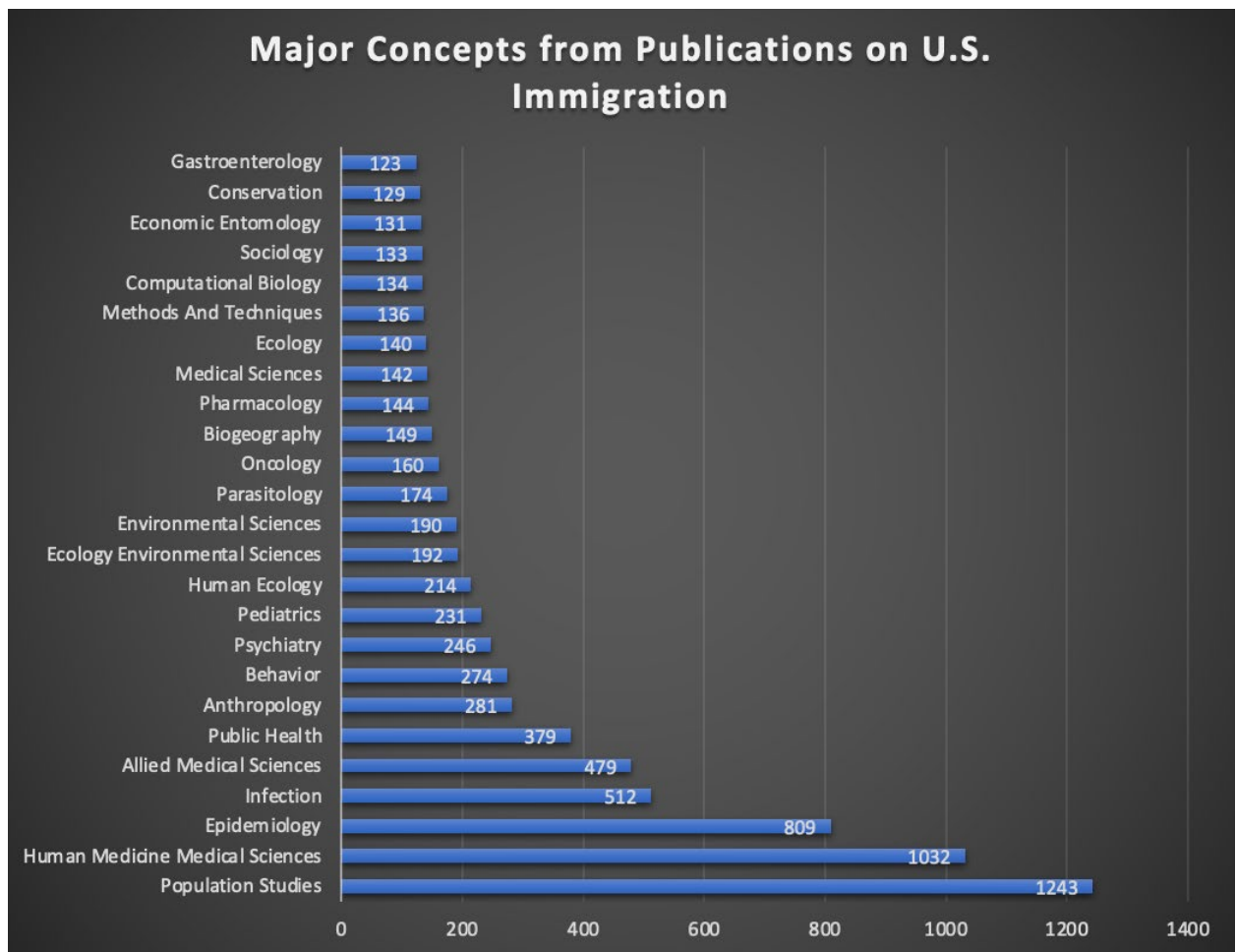


Figure 5: Major Concepts from Publications on U.S. Immigration

The data above conveys the variety of topics covered in the above-mentioned *Web of Science* database. The severity of this issue can be seen through the variety of topics that have interested the research community about U.S. immigration. Immigration is a multi-faceted issue that affects many different aspects of life— such as population studies, medicine, and behavior. With the copious amounts of research on this issue and the variety of topics that it covers, it is clear that United States immigration is an important subject matter in the modern world.

In this section, we will discuss the research methods that have been used to address United States immigration-related problems. We will examine both quantitative and qualitative research methods. Additionally, we will explore the various approaches used in the literature to address

immigration-related problems. Our aim is to provide readers with a comprehensive overview of the research methods that have been used to address immigration-related problems, and to highlight the magnitude of importance that the research community holds towards the problem of U.S. Immigration.

3.1 Life Expectancy vs Health Coverage and Services

Although the U.S. Immigrants have a greater life expectancy than U.S. natives, compared to those born in the United States, both children and adults who are immigrants experience significant disparities in terms of health insurance coverage and access to preventive healthcare services. To address this issue, recommendations and alternative approaches are proposed for enhancing health monitoring and establishing robust databases to assess the health of immigrants in the USA. (Singh,2013). The population of U.S. Immigrants have also grown tremendously in the past five decades. (Gibson,2023) Despite this, the systematic tracking of their health, mortality, and disease patterns across different ethnic and national groups is not yet widely practiced. National data systems in the US generally do not regularly collect and evaluate health statistics based on immigrant status.

3.2 Existing Solutions for Immigrants with Mental Health

In general, the methods that are effective in treating common mental health problems for the general population can be extended to migrants from diverse backgrounds. The experts of immigrant mental health found attention must be given to various contextual and practical issues that influence illness behavior, patient–physician communication and intercultural understanding (Kirmayer,2011). Challenges in immigrant mental health include communication, cultural shaping

of symptoms and illness behavior. The effect of family structure and process on acculturation (assimilation to a different culture), also hinder the mental health of migrants. (Kirmayer,2011). There is consistent evidence from qualitative studies and clinical experience in intercultural primary care that these challenges can be addressed into social and cultural context, the use of interpreters and culture brokers (people who build trust between persons of differing cultural systems) meetings with families and consultation with community organizations (Kirmayer,2011).

3.3 Possession of Fundamental Rights for Immigrants

The Amnesty International article emphasizes the importance of legal protection, access to basic needs such as shelter, food, and healthcare, education and job opportunities, and social inclusion (Amnesty International, 2023). To address these challenges, initiatives such as providing legal assistance, creating safe spaces for women, and promoting community-led responses to displacement were developed. The article concludes by calling on governments and individuals to take action to welcome migrants and create a more inclusive society (Amnesty International, 2023).

3.4 Quantitative Research

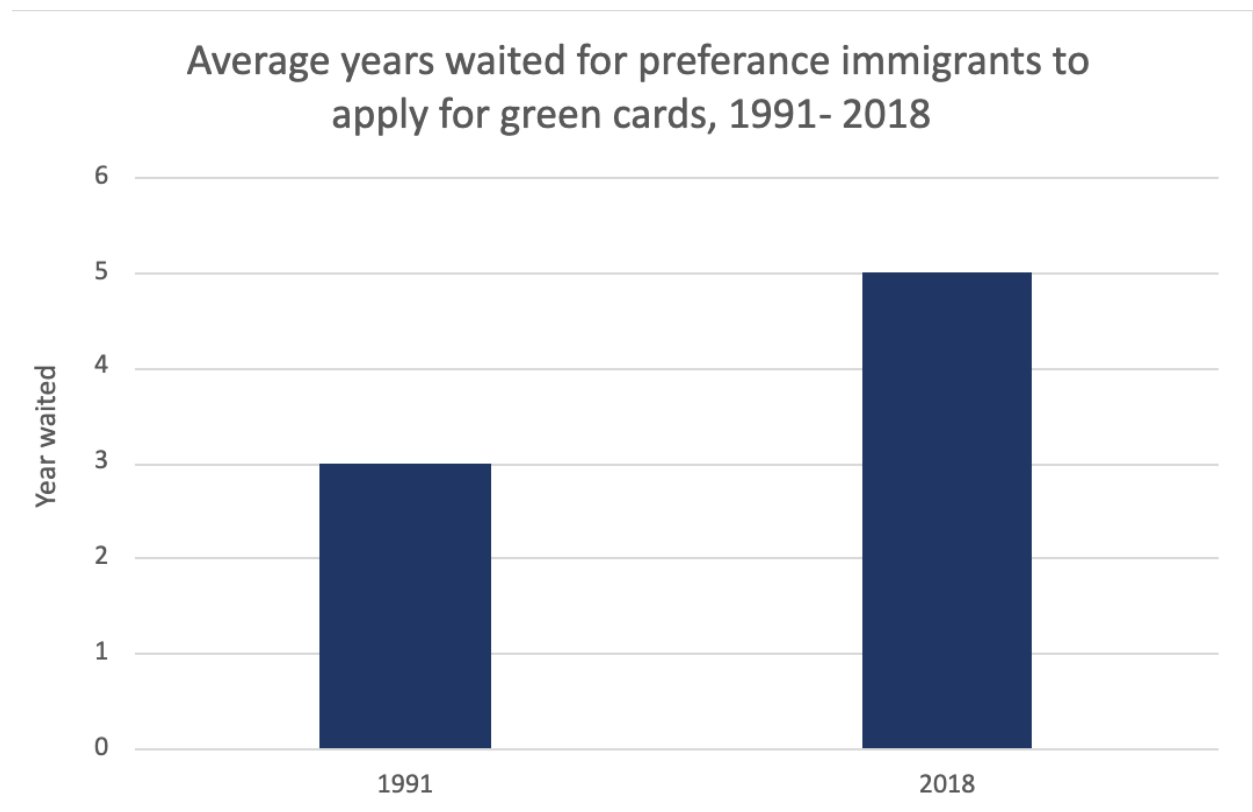


Figure 6: Average Immigration Wait Time

Sources: U.S. Department of State, "Visa Bulletin"; U.S. Department of State, "Annual Report of the Visa Office."

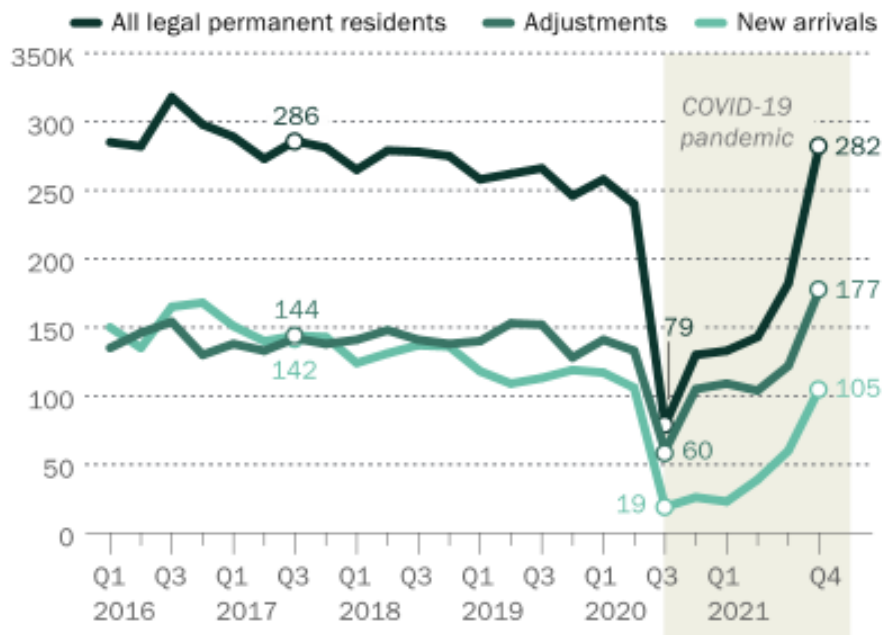
This figure reveals that there is significant, 2-year, variation among individual applicants in the backlog for green cards in the US. In 1991, 31% of immigrants in preference categories had no wait time due to quotas, but by 2018, this number had fallen to just 2%. Moreover, in 1991, only 3% of applicants waited a decade or more for a green card, whereas in 2018, 28% of applicants waited for a decade or more, and 41% waited for at least five years. This suggests that long waits have become more common in the US legal immigration system (Bier, 2019).

3.6 Research of Pandemic Effect on Green Card Backlog

According to a recent report from Pew Research Center, legal immigration to the United States has partially rebounded as national and global borders reopen. In 2021, the number of people who were granted lawful permanent residency increased by 11% compared to the previous year, after experiencing a decline in the early stages of the COVID-19 pandemic (Bandyopadhyay, 2021). The increase in legal immigration was mainly driven by family reunification and employment-based admissions. However, despite the partial rebound, the overall level of legal immigration to the US remains below pre-pandemic levels, and many immigrant visa applicants are still facing significant processing delays. The article also notes that the ongoing pandemic and changing immigration policies could continue to impact the future of legal immigration to the United States (Passel, 2022).

Green card totals for legal U.S. immigrants rebound to pre-pandemic levels

Lawful permanent resident admissions, in thousands



Notes: Data labels shown for April-June 2017, April-June 2020 and July-September 2021. Years shown are fiscal years, which run Oct. 1-Sept. 30 of designated year.
Source: Pew Research Center analysis of U.S. Department of Homeland Security Office of Immigration Statistics data.

PEW RESEARCH CENTER

Figure 7: COVID-19 Pandemic Effect on Green Card Totals

According to a report by Pew Research Center, the issuance of green cards for newly arriving immigrants in the United States experienced a steeper decline during the pandemic compared to those for immigrants already in the US on temporary visas. While green card issuances have partially recovered since the pandemic low point in the April-June 2020 period, the recovery has been slower for newly arriving immigrants. In the last quarter of fiscal 2021, approximately 105,000 green cards were issued to new arrivals, which is about 78% of the pre-pandemic quarterly average. In contrast, the number of green cards issued to immigrants already in the US on temporary visas (called "adjustment of status") did not experience as steep of a decline and has rebounded more strongly. By the final quarter of fiscal 2021, roughly 177,000 green cards

were issued for adjustments of status, more than any quarter recorded since at least fiscal 2016 (Passel, 2022).

4 Currently Available Online Tools

USCIS, the United States Citizenship and Immigration Services, provides a variety of online tools that can assist individuals with the immigration process. One such tool is the "Case Status Online" feature, which allows applicants to track the status of their case in real-time. Another helpful tool is the "Fee Calculator," which helps individuals determine the appropriate fees for their immigration application or petition. USCIS also offers a "Practice Civics Test" for those seeking U.S. citizenship, which can be accessed online to prepare for the actual test. Additionally, USCIS provides access to the E-Verify system, which allows employers and employees to verify the employment eligibility of themselves or their workers. These online tools provide a convenient way for individuals to navigate the often complex and confusing immigration process and can help streamline the application and petition process (USCIS).

Improving USCIS online tools would help individuals with limited digital access and skills navigate the immigration process more effectively. USCIS can provide more detailed and user-friendly instructions, offer more online resources and support such as live chat or virtual assistance, incorporate more interactive features such as videos or simulations, and provide multilingual support for individuals whose first language is not English. As the article notes, digital access refers to an individual's ability to obtain computers, smartphones, and a consistent connection to the internet, which requires recurring expenses. Limited access to these technologies can create significant obstacles for individuals navigating the immigration process. For instance, "an individual may have inconsistent access due to the constant need to add prepaid mobile airtime or

replace and repair technologies" (Migration Policy Institute, 2020). Immigrants from vulnerable subpopulations are more likely to have limited digital access, as they often have lower incomes, lesser levels of education, and belong to ethnic minorities. Therefore, it is essential to improve USCIS online tools to increase the accessibility of the immigration process for all individuals, particularly those who may face digital inequities.

Solution Design

To address the pressing issues faced by individuals aspiring for permanent residency in the United States, our proposed solution is the development of a website user interface through Streamlit, a Python-based library used to make machine learning web applications. This user interface consists of two key features: a descriptive analytics page and a predictive analytics page.

Our descriptive analytics page within the website user interface offers a rich array of graphical insights, meticulously designed to enhance users' comprehension of the immigration landscape. Among these visualizations are bar graphs and color-coded maps that illuminate key aspects. The distribution of cases for certain variables are displayed through “Number of Cases” bar plots. Simultaneously, waiting time trends are discernible through the “Average Waiting Time” plots, offering valuable insights into the evolving landscape over time.

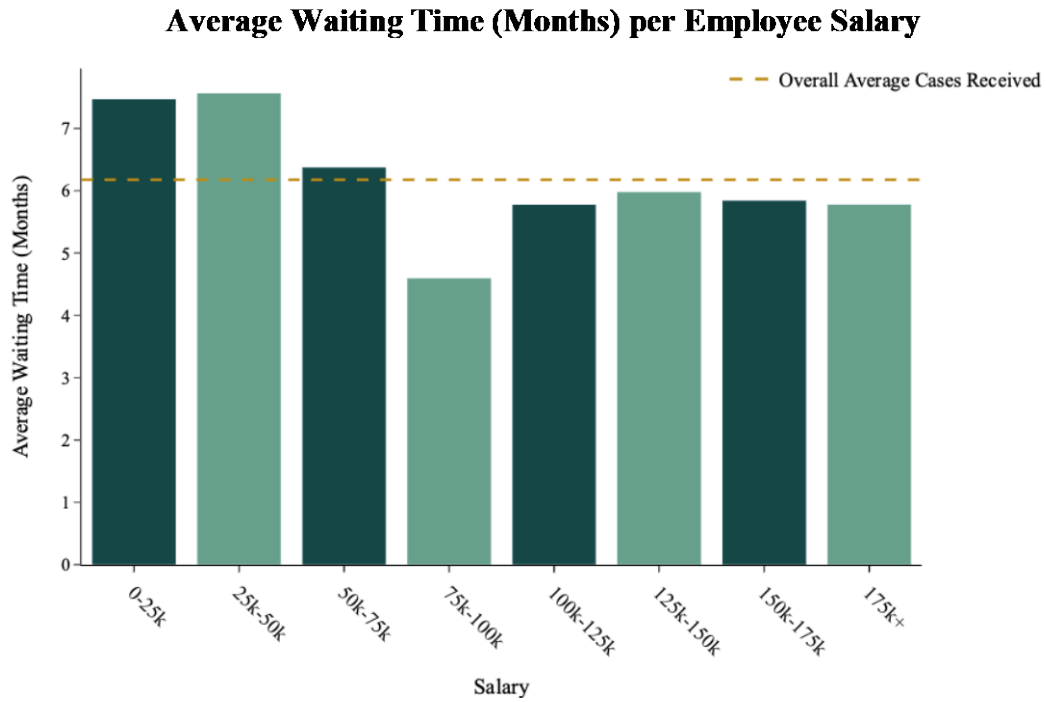


Figure 8: Average Waiting Time per Employee Salary

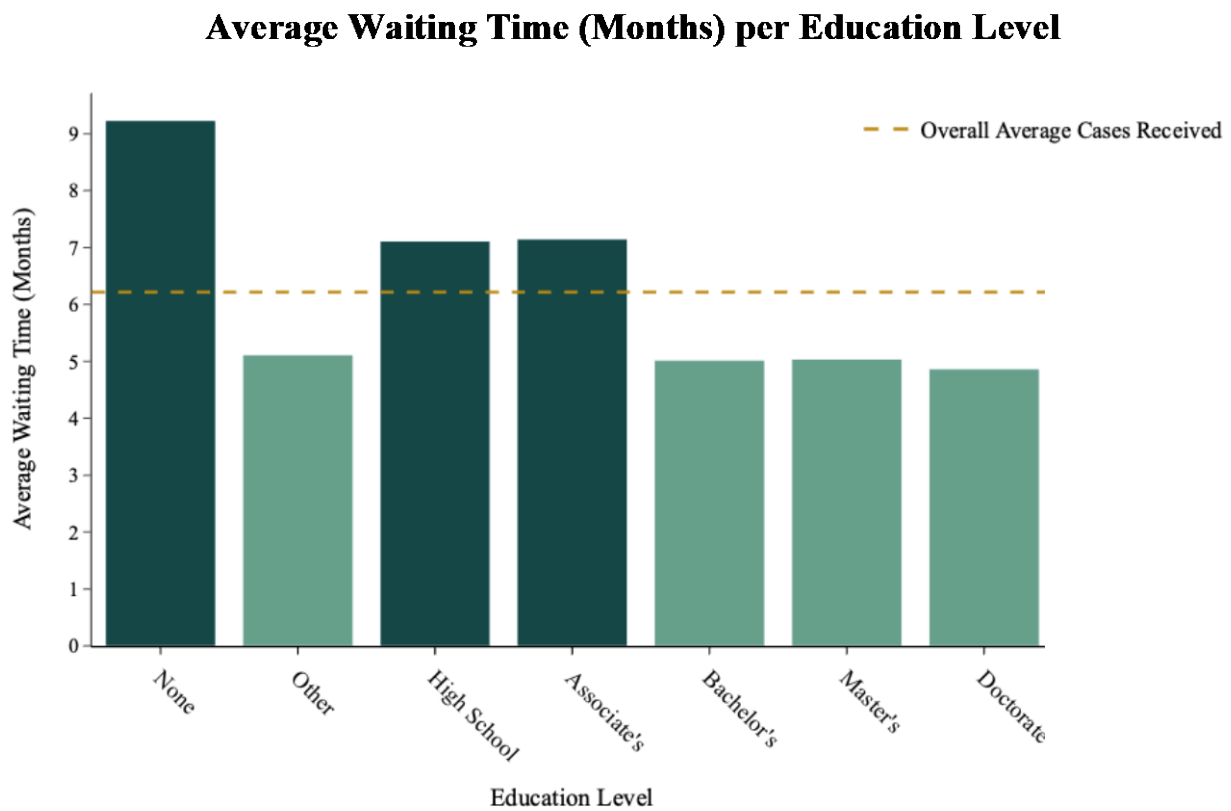


Figure 9: Average Waiting Time per Education Level

In addition to these bar graphs, the geographical distribution of employment locations is dynamically presented using a color-coded map of the United States, visually capturing the number of cases and average waiting time per each location of employment. For a global perspective, nationality is depicted through another color-coded world map, providing insights into the global distribution of applicants and their respective waiting times.

Average Waiting Time (Months) per Work State

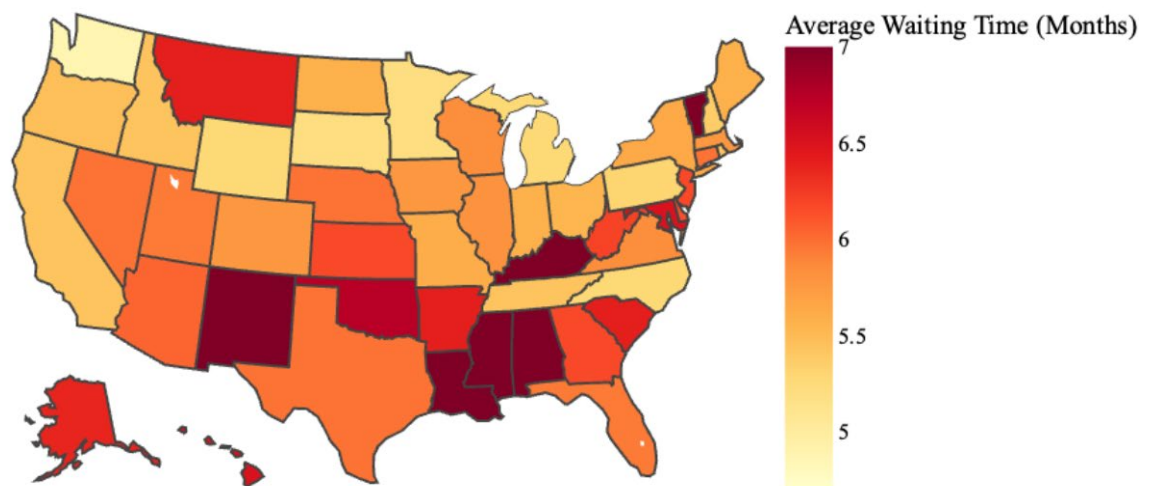


Figure 10: Average Waiting Time per Work State

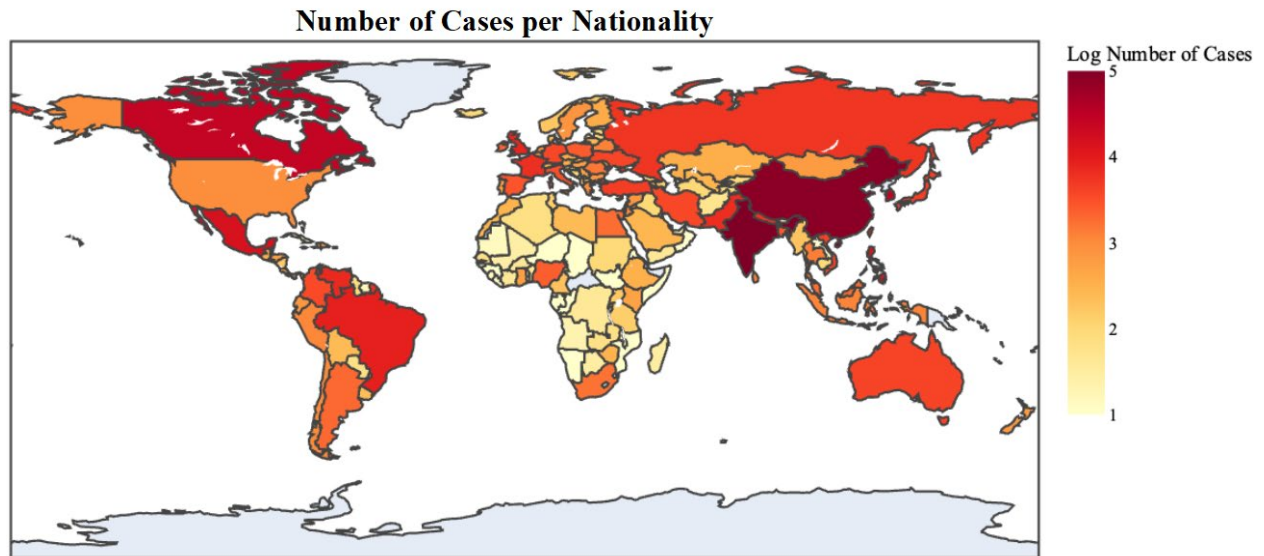


Figure 11: Number of Cases per Nationality

These visualizations represent only a subset of the comprehensive plots available on the user interface. Our meticulous approach captures numerous relationships, empowering users to extract meaningful insights. This diverse range of visualizations aims to facilitate informed decision-making and strategic planning throughout the intricate journey of immigration.

On the other hand, the predictive analytics page of the user interface will offer users the ability to input their own data and receive an estimation of the expected duration of their immigration process. Our Classification Random Forest model powers this predictive model, specifically predicting the applicant waiting time—the duration between the case received date and the decision date.

Estimate Your Green Card Application Wait Time

This predictive dashboard predicts the waiting time from the date the application was received by the U.S. Department of Labor's Office of Foreign Labor Certification (OFLC) to the date a decision was made by OFLC for green card applicants.

NAICS Code?

11 - Agriculture, Forestry, Fishing and Hunting

Prevailing Wage Level?

1

Prevailing Wage Amount

0

Class of Admission

A-3

Country of Citizenship

ARGENTINA

U.S. Work State?

AL

Employer Number of Employees

0

Highest Completed Education Level

High School

Do you have job/industry experience?

☒ Yes

☐ No

Months of Experience?

0

Have you been affected from layoff(s) in the past six months?

☒ Yes

☐ No

Submit

Figure 12: Predictive Dashboard User Form

A Random Forest model used in the predictive model is a powerful machine learning technique that combines ensemble learning and decision tree methods. It operates by constructing multiple random trees from the given data and then aggregates their results to make robust predictions or classifications. Each tree is built independently, introducing randomness in the form of feature selection and data sampling. By averaging the outputs of these diverse trees, the Random Forest model leverages the collective wisdom of the ensemble, providing a more accurate and reliable prediction than individual trees. This approach enhances the model's ability to handle complex relationships within the data, mitigate overfitting, and improve overall performance on diverse datasets (IBM).

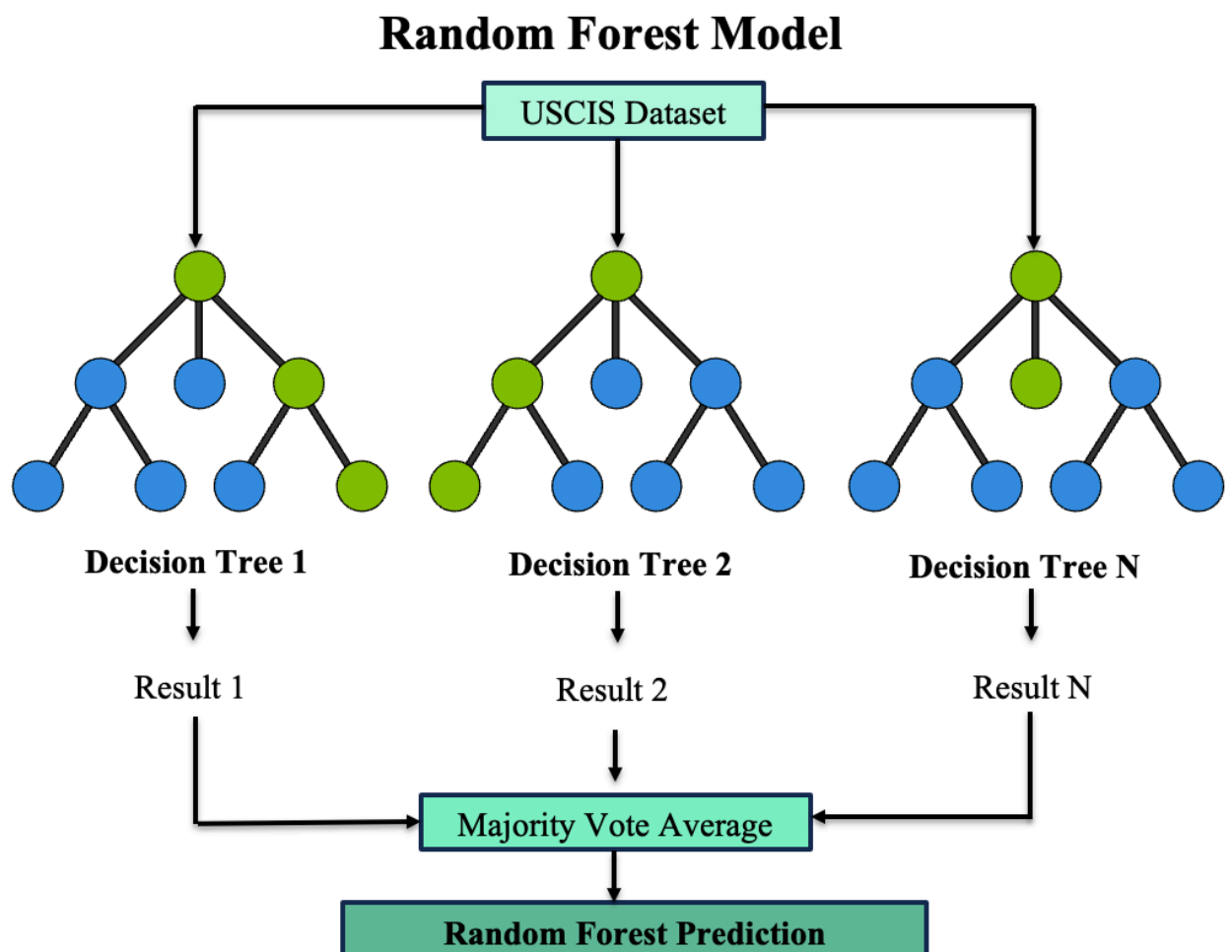


Figure 13: Random Forest Model

The model classifies waiting times into two categories: 0-6 months and 6+ months. The goal is to provide insights into the likelihood of applications falling into distinct waiting time categories, aiding effective processing time management. The prevailing wage amount and the employer company size emerge as the most influential factors, indicating that salary levels and employer size strongly influence waiting time predictions. Additionally, factors such as Employment History, Education, and Geographic/Industry Considerations significantly contribute to the model’s predictions (Figure 13).

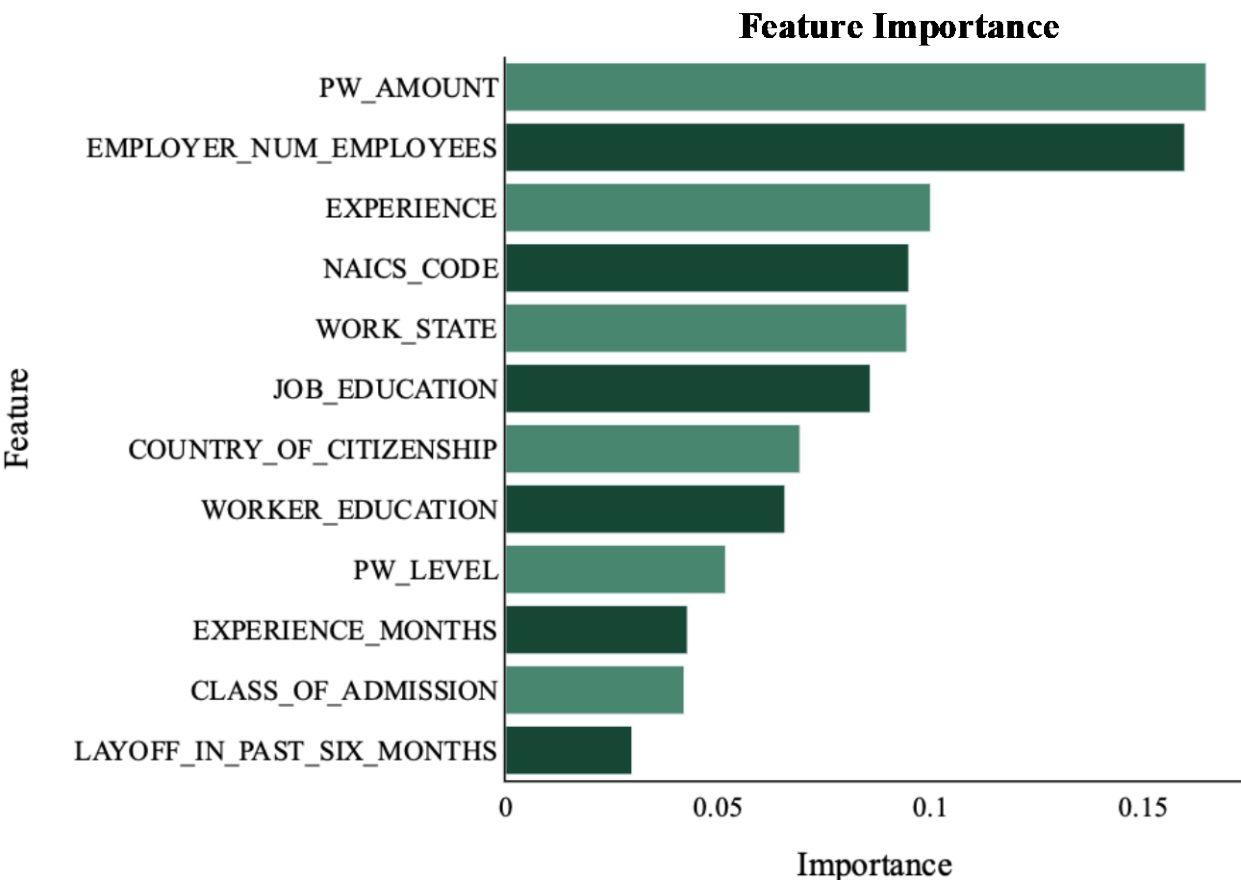


Figure 14: Model Feature Importance Plot

Upon accessing the website, users encounter an informative home page, graphical representations illustrating data trends, and a predictive dashboard. Utilizing the predictive

dashboard user form, an applicant can gauge their expected processing duration. By inputting essential details associated with the model's features, our predictive dashboard will provide the user with an estimate of which class their wait time will fall under: 0-6 months or 6+ months, chosen by maximizing the model's performance. This empowers individuals to make informed decisions, manage expectations, and prepare effectively for potential challenges throughout their immigration journey.

To optimize user interaction and streamline data exploration across the user interface, a tab-based system has been implemented, corresponding to key sections such as the Home Page, Project Overview, Descriptive Analytics, Predictive Analytics, and User Survey. Each tab serves as a gateway to a specific area, offering a focused exploration of relevant information.

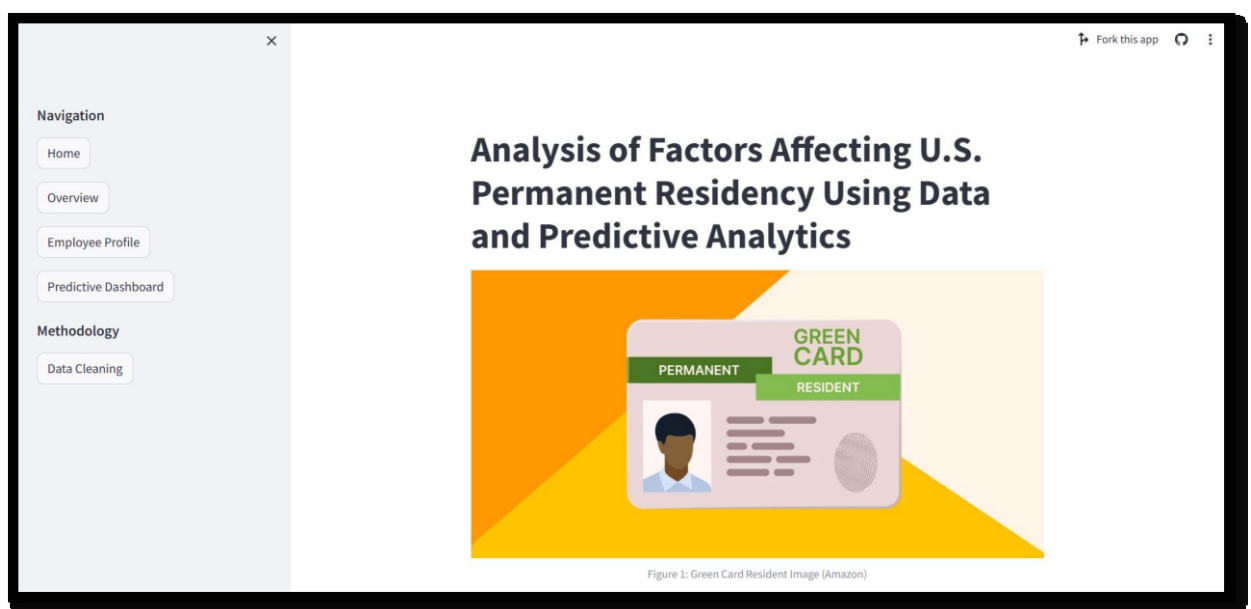


Figure 15: User Interface Home Page

While alternative presentation methods were considered, the chosen approach of utilizing separate tabs offers a cohesive and intuitive user experience. This tab-based organization ensures that users can effortlessly navigate between distinct sections, focusing on specific aspects of interest across the entire spectrum of the user interface.

In summary, this user interface offers a wide range of visualizations and features, empowering users with crucial insights into the green card application process. By providing a comprehensive understanding of waiting times, industry trends, correlations, and other relevant factors, we aim to support applicants in making informed decisions and navigating the complex immigration system more effectively and efficiently.

Validation of Design Solution

The validation of our design solution is a crucial phase in ensuring the efficacy and reliability of our platform. Leveraging the data collected and processed through our descriptive user interface, we develop and implement a machine learning model that serves as the foundation for our predictive analytics user interface. Our verification process involves comprehensive testing of the accuracy and performance of our model, employing the F1-Macro score as a key metric to evaluate its precision and recall. Evaluation utilizing F1-Macro offers a balanced measure of precision (accuracy of positive predictions) and recall (ability to capture all positives), providing a robust assessment of our model's performance.

In addition to our testing metric choice, we select a Random Forest model as particularly suited to the diverse nature of our dataset. The Random Forest model excels in handling noise and irrelevant features, showcasing its ability to reduce overfitting and deliver effective performance on datasets characterized by heterogeneity. Through this combination of F1-Macro score evaluation and the application of a Random Forest model, we are dedicated to ensuring that our platform generates reliable and precise predictions for users.

Verification of Design Solution

As part of our broader verification process, we conduct preliminary testing to gather feedback from individuals who have undergone the immigration process. To gauge the potential usefulness of our descriptive analytics user interface, we integrate a survey tab into our interface layout. This survey solicits specific feedback on the relevance and helpfulness of the information provided by our user interface in the context of their immigration journey.

The feedback from these respondents offers valuable insights into the potential impact of our descriptive analytics user interface. While this initial testing serves as an important validation of our user interface's potential value, we acknowledge the necessity for more extensive and comprehensive testing with a larger sample size to capture a broader range of perspectives and ensure the effectiveness of our solution.

Additionally, we have verified the success of our solution through close collaboration with our project sponsor, Dr. Puneet Agarwal. We maintain a regular schedule of weekly meetings with Dr. Agarwal to discuss the state of the project. His involvement and feedback have been instrumental in shaping the direction of our design solution. We are pleased to report that Dr. Agarwal has expressed satisfaction with the progress and outcomes of our work, validating the effectiveness and relevance of our design solution in the realm of immigration analytics.

Conclusion

In conclusion, our immigration user interface serves as an invaluable resource, providing users with crucial insights into the present state of the immigration system. The information provided by our user interface plays a vital role in empowering applicants seeking permanent residency, reducing uncertainty, and facilitating a smooth navigation through the intricacies of the

process. Additionally, our user interface proves relevant to stakeholders such as policymakers and advocacy groups, as it sheds light on challenges and highlights the necessity for reforms. By doing so, our results contribute to a greater understanding of the system and the opportunities for improvement, further cementing the significance of our platform.

Our research objective of enhancing transparency through machine learning models and leveraging historical data for forecasting green card processing times has been met. As a team deeply connected to the immigration process in America, we view this project not only as a technological advancement, but as a potential catalyst for change. We hope that our efforts shed light on the substantial immigration backlog in America, ultimately contributing to increased transparency and understanding for those navigating this intricate process.

Future Directions

To culminate our project, we are honored to present our findings at the 2023 Society of Risk Analysis (SRA) Conference in Washington DC. This work is exceptionally vital as the immigration process is often marked by confusion, and our project represents a significant stride toward increasing transparency for individuals engaged in the legal immigration journey.

This project, while impactful, is only a small step in the ongoing effort to enhance transparency, reliability, and predictability in the immigration process for future applicants. To further refine and augment our interface, we recognize the need for more comprehensive data—additional cases and factors for each applicant—that will enable us to provide even more accurate predictions.

Sources

- About the Author. (2022, July 12). *The Muslim ban exposes the racialization of religion in America*. UC Press Blog. Retrieved March 17, 2023, from <https://www.ucpress.edu/blog/56304/the-muslim-ban-exposes-the-racialization-of-religion-in-america/>
- AIC. (2021, October 9). *Why don't immigrants apply for citizenship?* American Immigration Council. Retrieved March 17, 2023, from <https://www.americanimmigrationcouncil.org/research/why-don%E2%80%99t-they-just-get-line>
- American Psychiatric Association. (n.d.). *Undocumented immigrants*. Psychiatry.org - Undocumented Immigrants. Retrieved March 17, 2023, from <https://www.psychiatry.org/psychiatrists/diversity/education/stress-and-trauma/undocumented-immigrants#:~:text=Immigration%2Drelated%20stressors%20can%20increase,PTSD%20and%20other%20psychological%20disorders>
- American Psychological Association. (n.d.). *Psychology of immigration 101*. American Psychological Association. Retrieved March 17, 2023, from <https://www.apa.org/topics/immigration-refugees/immigration-psychology>
- Bandyopadhyay, Subhayu, and Asha Bharadwaj. "Immigration: The Characteristics of Green Card Holders: St. Louis Fed." *Saint Louis Fed Eagle*, Federal Reserve Bank of St. Louis, 9 Dec. 2021, <https://www.stlouisfed.org/publications/regional-economist/fourth-quarter-2019/immigration-characteristics-green-card-holder>.
- Bartell, A. P. (1989). Where Do the New U.S. Immigrants Live? *Journal of Labor Economics*, 7(4), 371–391. <https://doi.org/10.1086/298213>
- Bier, D. J. (2019, June 18). *Immigration Wait Times from Quotas Have Doubled: Green Card Backlogs Are Long, Growing, and Inequitable*. Cato.org. Retrieved March 1, 2023, from <https://www.cato.org/publications/policy-analysis/immigration-wait-times-quotas-have-doubled-green-card-backlogs-are-long#introduction>
- Budiman, A. (2022, December 1). *Key findings about U.S. immigrants*. Pew Research Center. Retrieved March 17, 2023, from <https://www.pewresearch.org/fact-tank/2020/08/20/key-findings-about-u-s-immigrants/>

- Cherewka, A. (2020, September 3). *The digital divide hits U.S. immigrant households disproportionately during the COVID-19 pandemic*. migrationpolicy.org. Retrieved March 17, 2023, from <https://www.migrationpolicy.org/article/digital-divide-hits-us-immigrant-households-during-covid-19>
- Chuong, S. T. (2006). *Location Choices of New U.S. Immigrants*. <https://www.semanticscholar.org/paper/Location-Choices-of-New-U.S.-Immigrants-Chuong/4afa486f28a0def076376f3d83addb999f1608c3>
- Clark, E. H., Fredricks, K., Woc-Colburn, L., & Bottazzi, M. E. (2020). Disproportionate impact of the COVID-19 pandemic on immigrant communities in the United States. *PLOS Neglected Tropical Diseases*, 14(7), e0008484. <https://doi.org/10.1371/journal.pntd.0008484>
- Depillis, L. (2023, February 6). *Immigration rebound eases shortage of workers, up to a point*. The New York Times. Retrieved February 28, 2023, from <https://www.nytimes.com/2023/02/06/business/economy/immigration-labor.html>
- EB-1A: Extraordinary ability green card*. VisaNation. (2023, February 6). Retrieved February 22, 2023, from <https://www.immi-usa.com/eb1-green-card/eb-1-extraordinary-ability/>
- EB-2 visa, explained*. Boundless. (2023, February 7). Retrieved March 9, 2023, from <https://www.boundless.com/immigration-resources/eb2-visa-explained/>
- EB-2: Employment-based immigration— advanced degree or exceptional ability*. USCIS. (2022, February 24). Retrieved February 24, 2023, from <https://www.uscis.gov/forms/explore-my-options/eb-2-employment-based-immigration-advanced-degree-or-exceptional-ability>
- EB1 visa - US employment green card for extraordinary persons*. VisaGuide.World. (n.d.). Retrieved February 22, 2023, from <https://visaguide.world/us-visa/immigrant/eb1/>
- Eb2 green card - documents, Processing Times & Priority Dates - Path2USA*. (n.d.). Retrieved February 23, 2023, from <https://www.path2usa.com/green-card/eb/eb2-visa>
- Employment-based Green Card*. The American Dream. (n.d.). Retrieved March 12, 2023, from <https://www.the-american-dream.com/employment-based-green-card/>
- Employment-based immigration: First preference EB-1*. USCIS. (2022, March 1). Retrieved February 22, 2023, from <https://www.uscis.gov/working-in-the-united-states/permanent-workers/employment-based-immigration-first-preference-eb-1>

Employment-based immigration: Second preference EB-2. USCIS. (2022, April 20). Retrieved February 22, 2023, from <https://www.uscis.gov/working-in-the-united-states/permanent-workers/employment-based-immigration-second-preference-eb-2>

Gibson, C. (2022, October 6). *U.S. immigrant population and share over time, 1850-present.* migrationpolicy.org. Retrieved March 12, 2023, from <https://www.migrationpolicy.org/programs/data-hub/charts/immigrant-population-over-time>

Green cards and permanent residence in the U.S. USAGov. (n.d.). Retrieved February 22, 2023, from <https://www.usa.gov/green-cards>

Kanno-youngs, Z. (2023, May 12). *Backlogged courts and years of delays await many migrants.* The New York Times. [https://www.nytimes.com/2023/05/12/us/politics/immigration-courts-delays-migrants-title-42.html#:~:text=The%20backlog%20of%20immigration%20cases,\(TRAC\)%20at%20Syracuse%20University](https://www.nytimes.com/2023/05/12/us/politics/immigration-courts-delays-migrants-title-42.html#:~:text=The%20backlog%20of%20immigration%20cases,(TRAC)%20at%20Syracuse%20University).

Khosla, P. (2018). Wait time for permanent residency and the retention of immigrant doctoral recipients in the U.S. *Economic Analysis and Policy.* <https://doi.org/10.1016/j.eap.2017.11.002>

Kim, J. (2023, February 7). *Immigration fees may go up and green card applicants could be hard hit.* NPR. Retrieved February 22, 2023, from <https://www.npr.org/2023/02/07/1151702222/immigration-fees-uscis-green-card-applicants-hard-hit>

Kirmayer, L. J., Narasiah, L., Munoz, M., Rashid, M., Ryder, A. G., Guzder, J., Hassan, G., Rousseau, C., Pottie, K., & Canadian Collaboration for Immigrant and Refugee Health (CCIRH). (2011, September 6). *Common mental health problems in immigrants and refugees: General approach in primary care.* CMAJ : Canadian Medical Association journal = journal de l'Association medicale canadienne. Retrieved February 24, 2023, from <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3168672/>

Kishinami, H. (2023, February 17). *Employment-based Green Card Priority Date Retrogression.* Lexology. Retrieved March 1, 2023, from <https://www.lexology.com/library/detail.aspx?g=f622eca4-f078-4fe5-9643-b27683e5ee49>

Knoll, B. R. (2009, June). "And Who Is My Neighbor?" Religion and Immigration Policy Attitudes. Wiley on behalf of Society for the Scientific Study of Religion. <https://www.jstor.org/stable/pdf/40405619.pdf>

Kreighbaum, A. (2022, December 16). *Waiting for permanent residency: Green Card Backlogs explained*. Bloomberg Law. Retrieved February 22, 2023, from <https://news.bloomberglaw.com/daily-labor-report/waiting-for-permanent-residency-green-card-backlogs-explained>

Lamey, A. (2023, February 22). *The jurisdiction argument for immigration control: A Critique volume 42, issue 3, july 2016*. Social Theory and Practice. Retrieved March 17, 2023, from https://www.pdcnet.org/soctheorpract/content/soctheorpract_2016_0042_0003_0581_0604

Migration Policy Institute. (2023, March 10). *U.S. Unemployment Trends by Nativity, Gender, Industry, & More.* migrationpolicy.org. <https://www.migrationpolicy.org/programs/migration-data-hub/us-unemployment-trends-during-pandemic>

Mukhopadhyay, S., & Oxborrow, D. (2012). The Value of an Employment-Based Green Card. *Demography*. <https://doi.org/10.1007/s13524-011-0079-3>

Nic, O.-. (2021, March). *Global Trends: A More Contested World*. Office of the director of National Intelligence - Global Trends. Retrieved February 22, 2023, from <https://www.dni.gov/index.php/gt2040-home/gt2040-deeper-looks/future-of-migration>

Passel, J. S., & Cohn, D. V. (2022, April 4). *Legal immigration to the U.S. partially rebounds as national and global borders reopen*. Pew Research Center. Retrieved March 1, 2023, from <https://www.pewresearch.org/fact-tank/2022/04/04/legal-immigration-to-the-u-s-partially-rebounds-as-national-and-global-borders-reopen/>

Petts, J. (2022, May 26). *10 reasons for Your Green Card Application Denial*. Immigration Help. Retrieved February 22, 2023, from <https://www.immigrationhelp.org/learning-center/10-reasons-for-your-green-card-application-denial>

Piereson, J., Mukherjee, R., Salam, R., & Martino, D. D. (2022, December 15). *Reducing the immigration backlog*. Manhattan Institute. Retrieved March 12, 2023, from <https://www.manhattan-institute.org/reducing-immigration-backlog#:~:text=A%20record%20backlog%20of%20immigration,other%20rich%20English%20Dspeaking%20nations.>

Ruiz, J. (n.d.). *Latinas/os and Immigration Reform: A Commentary to "Crossroads: The Psychology of Immigration in the New Century"-The Report of the APA Presidential Task Force on Immigration*. Web of science. Retrieved March 15, 2023, from <https://www.webofscience.com/wos/woscc/full-record/WOS:000440897400002>

Sackey-Ansah, A. (n.d.). *Ethical theories and approaches to immigration in the United States: A ... Ethical Theories and Approaches to Immigration in the United States: A Focus on Undocumented Immigrants*. Retrieved March 18, 2023, from <https://journals.sagepub.com/doi/pdf/10.1177/0265378821994215?download=true>

Singh, G. K., Rodriguez-Lainz, A., & Kogan, M. D. (2013, October 27). *Immigrant Health Inequalities in the United States: Use of eight Major National Data Systems*. TheScientificWorldJournal. Retrieved March 12, 2023, from <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3826317/>

Straut-Eppsteiner, H. *Citizenship and Immigration Statuses of the U.S. Foreign-Born Population. The Green Card, explained*. Boundless. (2023, February 8). Retrieved February 22, 2023, from <https://www.boundless.com/immigration-resources/the-green-card-explained/>

University, S. C. (n.d.). *What is immigration ethics?* Markkula Center for Applied Ethics. Retrieved March 17, 2023, from <https://www.scu.edu/ethics/focus-areas/immigration-ethics/immigration-ethics-resources/what-is-immigration-ethics/>

Visa Bulletin For December 2023. (n.d.). Travel.state.gov. Retrieved November 24, 2023, from https://travel.state.gov/content/travel/en/legal/visa-law0/visa-bulletin/2024/visa-bulletin-for-december-2023.html?trk=public_post_comment-text

Waiting for Permanent Residency: Green Card Backlogs Explained. (n.d.). News.bloomberglaw.com. Retrieved November 24, 2023, from <https://news.bloomberglaw.com/daily-labor-report/waiting-for-permanent-residency-green-card-backlogs-explained>

Ways to welcome. Amnesty International. (2021, July 5). Retrieved March 1, 2023, from <https://www.amnesty.org/en/i-welcome-community-2/welcoming-refugees-solutions/>

What Is Random Forest? (N.d.). Retrieved from <https://www.ibm.com/topics/random-forest#:~:text=Random%20forest%20is%20a%20commonly,both%20classification%20and%20regression%20problems>.

Why don't immigrants apply for citizenship? American Immigration Council. (2021, October 9). Retrieved March 17, 2023, from <https://www.americanimmigrationcouncil.org/research/why-don%E2%80%99t-they-just-get-line>