SOLO ROUTE: SAFE TRIP RECOMMENDER

COHORT 3: TEAM 16- LYNNETTA BONSU, SHEMAINE BENSON, DAISY OKPA AND SHANTEL WILLIAMS

HIGHLIGHTS

- Having a true sense of safety is one of the most important features people look for when traveling
- With solo travel on the rise, the safety of women, LGBTQ+ individuals, and BIPOC needs serious evaluation. Solo Route provides this evaluation and supplies the results
- Overall, the safest country to travel to is Norway and the least safe country to travel to is Brazil

BUSINESS PROBLEM

SOLO ROUTE is a company that seeks to offer solutions to help travelers feel empowered, especially for solo experiences. Travelers who identify as **women**, **LGBTQ+**, and/or **BIPOC** face dangers and difficulties while traveling, which can ultimately impact one's physical and/or mental health. Solo Route's safe trip recommender predicts the safest countries to travel to in 2022, in addition to destinations which offer essential resources like connectivity.

BACKGROUND

- Americans forecasted to spend $1.06T in total travel expenditures in 2022. $131B will be for international travel. (Tourism Economics and US Travel Assoc.)
- Aside from the travel advisories published on the US Dept. of State website only provides travel advisories for COVID-19 and terrorism alerts
- Safety precautions for specific groups of travelers are often neglected

DATASETS

Social Progress Index

- 10 years, 163 countries, 50 indicators
- Health, safety, education, rights, technology data across > 99.85% of world's population

Legatum Progress Index

- 15 years, 167 countries, 300 indicators
- Personal freedom, governance, living conditions, infrastructure data across 99.4% of global population

Team 16 selected a number of variables (indicated below) and merged datasets to create 6 safety indicies/domains.

Women
3 indicators

LGBTQ+
4 indicators

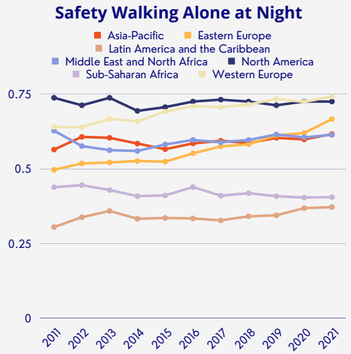
Race/Ethnicity
3 indicators

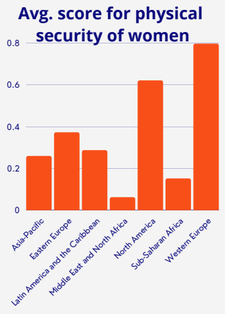
Safety
9 indicators

Policy & Rights
10 indicators

Connectivity & Convenience
7 indicators

DATA INSIGHTS





ANALYSIS

- Sample decision matrix analyzed and evaluated with 3 multi-criteria decision analysis (**MCDA**) methods
- Used to summarize the data into scores and ranks to feed into our chosen model(s)
- Weighted sum model (**WSM**) ultimately selected and applied to dataset to produce final rankings/scores for each index.
- Several alternatives eliminated due to null values. Criteria and years were weighted based on level of importance/relevancy

MCDA

	Botswana	Israel	Suriname	Mexico	Haiti	Malawi	United States	Mongolia	Zimbabwe
Rank	3	1	5	2	8	6	4	9	7

Method: WeightedSumModel

	Botswana	Israel	Suriname	Mexico	Haiti	Malawi	United States	Mongolia	Zimbabwe
Rank	3	1	5	2	7	9	4	8	6

Method: WeightedProductModel

	Botswana	Israel	Suriname	Mexico	Haiti	Malawi	United States	Mongolia	Zimbabwe
Rank	3	1	6	2	8	5	4	9	7

Method: TOPSIS

Process

- Create decision matrix
- Define decision & objective
- Structure criteria & alternatives
- Assign weights of criteria
- Score and rank alternatives

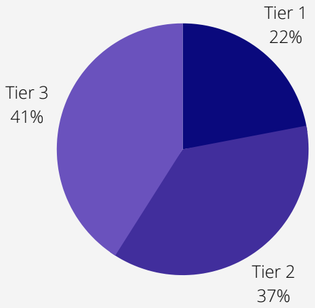
Methods

- Weighted Sum Model
- Weighted Product Model
- TOPSIS

MODELING

After performing MCDA, we then use classification modeling in order to predict the countries that would be safe to travel to in future years. We created a 3-tier system for this. Tier 1 being the **safest**, Tier 2 being **fairly safe**, and Tier 3 being **unsafe** based on the category someone belongs to.

Percentage of Countries in Each Tier for Women Solo Travelers



The classification modeling algorithms that we tried were: **K-nearest Neighbors, Linear Discriminant Analysis**, and **Support Vector Machines**.

Model Assessment for Women's Safety Index

Model	Accuracy	Recall	Precision	F-score
K-nearest Neighbors	1.000	0.992	0.991	0.923
Support Vector Machines	0.976	0.976	0.958	0.965
Linear Discriminant Analysis	0.929	0.920	0.941	0.925

Model Assessment for LGBTQ+ Safety Index

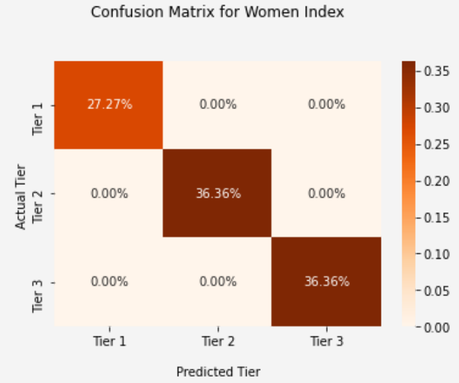
Model	Accuracy	Recall	Precision	F-score
K-nearest Neighbors	0.968	0.958	0.966	0.960
Support Vector Machines	1.000	0.997	1.000	0.999
Linear Discriminant Analysis	0.969	0.977	0.967	0.971

Using the women and LGBTQ+ safety indexes as examples, the tables above highlight which model yielded the best predictions.

Overall safety, women, social, BIPOC, and access were best represented by **K-nearest Neighbors.** While **Support Vector Machines** was the best model for predicting the LGBTQ+ safety index.

RESULTS/FINDINGS

Our machine learning model was able to predict which Tier a percentage of countries would belong to. The following **confusion matrix** represents the predictions for the Women's Safety Index.



This information will be useful for those planning travel in the upcoming year and beyond. We hope to expand this model to provide more granular information to our solo routers.

KEY TAKEAWAYS

- The selected classification model and our **interactive dashboard** grants solo travelers the visibility they desire when it comes to their safety
- Having this key information available will foster a safe, comfortable and all around enjoyable experience which is something we all deserve
- Refining our model and dashboard further will eventually create a global platform for individuals traveling around the world where they can share their experiences and offer recommendations