

Analysis of global terrorism data (1970-2015)

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Abstract

This poster aims to highlight the most terrorism affected areas, comparison of HDIs (Human Development Index) for countries, the number of killings and the type of weapons used in the terrorist activities. Additionally, we developed a R-shiny interactive application to depict the plane hijacking activities all over the world from the year 1970-2015. We also built a prediction model to predict the success and failure of a terrorist attack for the year 2015.

Introduction

Terrorism is one of the major global concern which today affects almost every nation of the world. The Global Terrorism Database(GTD[1]) is an open-source database comprising of information on domestic and international terrorist attacks around the world from the year 1970 - 2015. The database is maintained by the National Consortium for the Study of Terrorism and Responses to Terrorism (START) with its headquarters at the University of Maryland. The database is vast with 156772 observations of 137 variables. During the process of data cleaning, we discarded few columns which were overlapping other columns and used only relevant columns for visualization.

The Big Picture

Figure 1 depicts the number of terrorist attacks that took place between 1970 - 2015 all around the world. The red bars show the number of successful terror attacks and the blue bars show the number of failed attacks.

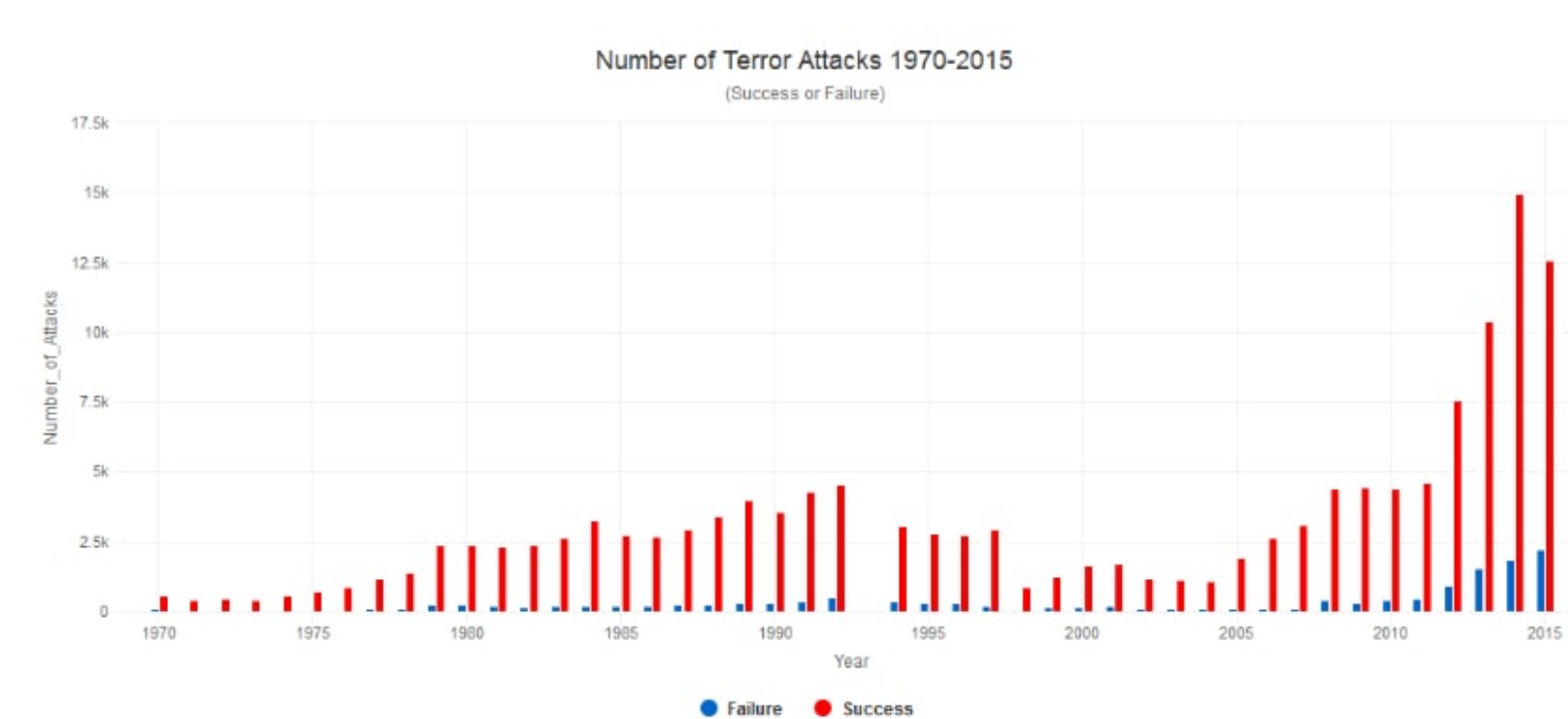


Figure 1: Terror Attacks(Success vs Failure)

Terrorism Vs Human Development Index

In this section, we are visualizing the relation between the HDI[2] and Number of attacks in a country and we observed the following:

- In Figure 2, we compared the HDI values and number of attacks for all countries by a line graph.

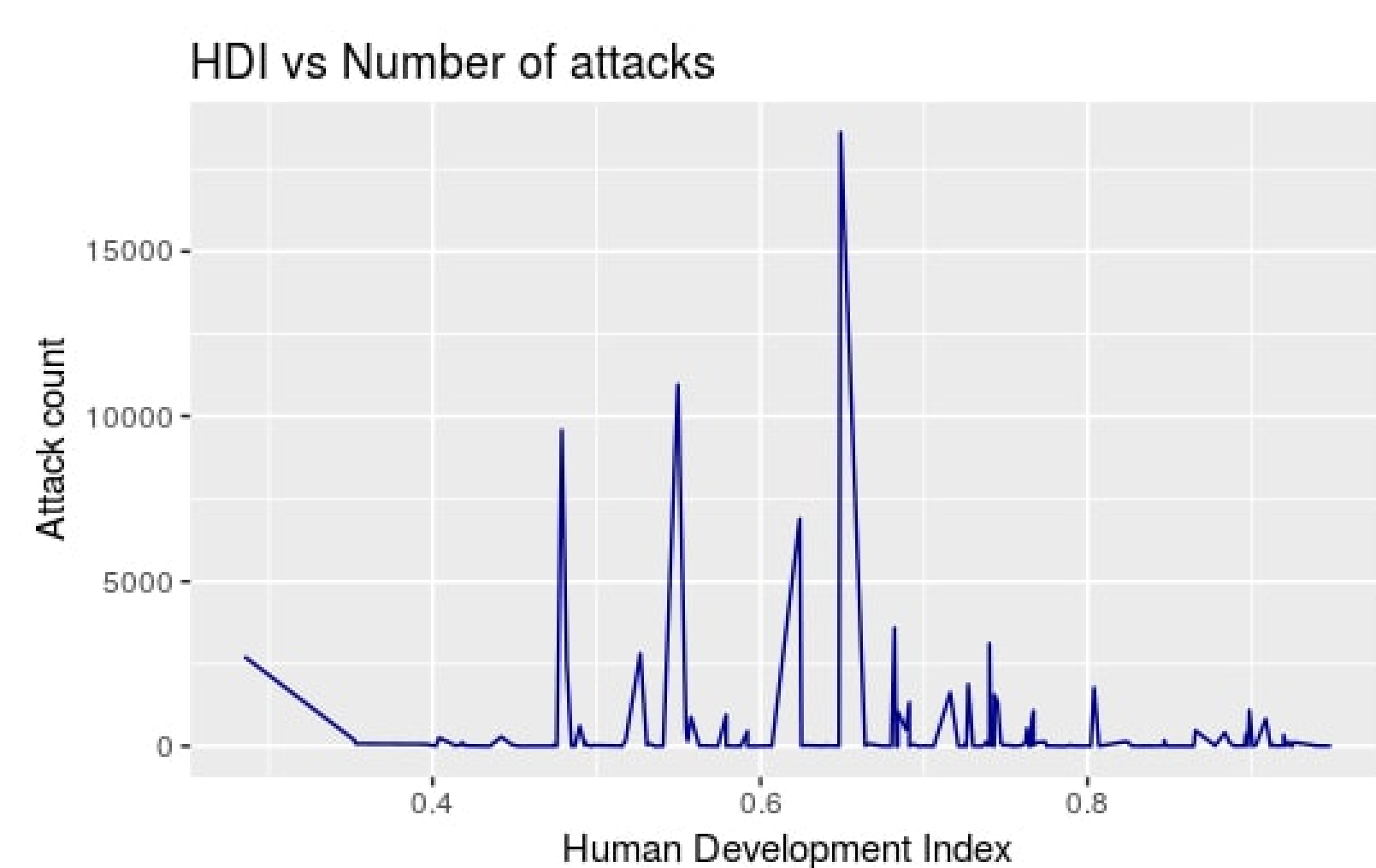


Figure 2: HDI vs Number of attacks

We expected to see a dependency between HDI values and the number of attacks but we found that HDI is not a very conclusive measure for comparison with the number of attacks. The countries with higher and lower HDI values have fewer number of attacks as we can see from the above graph. However, countries which have a large number of attacks, their HDI values remain in between the range 0.5 - 0.7 which means that terrorist attacks surely affect the HDI but it's not the only factor responsible for lower HDI.

- In Figure 3, We compared the HDI of top 10 countries for the years 1990 and 2016 with respect to the highest number of terrorist attacks.

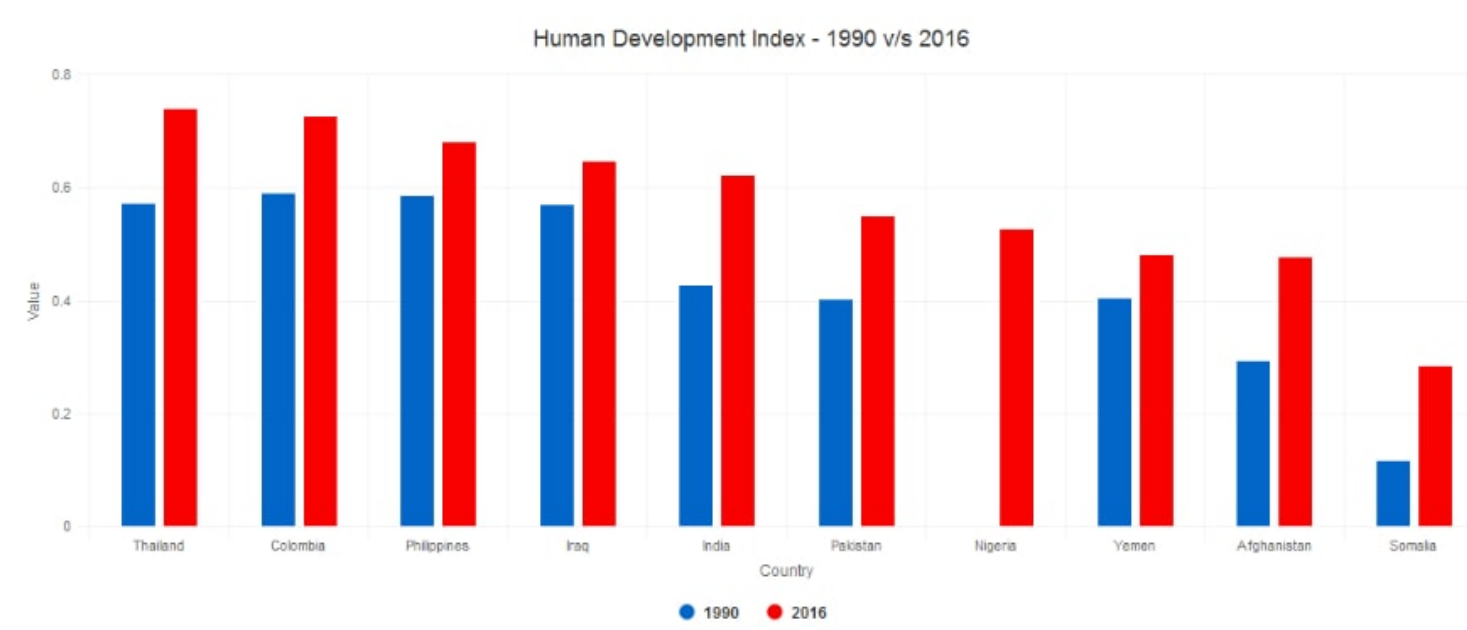


Figure 3: HDI comparison for top 10 attacked countries(1990 vs 2016), No data for Nigeria since it was not founded back in 1990

From Figure 3, we observe that the HDI values have increased over the time span of 25 years but with a very little percentage increase.

Plane Hijack Visualization - Rshiny App

We built a Rshiny application to visualize all plane hijackings from the year 1970 - 2015. After extracting plane hijacking data from the complete terrorism data, we used *ui*, *server* and *shinyApp* functions of Rshiny library to build the application. The *ui* is responsible for the user interface settings while the *server* does all computational tasks (subsetting in our case). *shinyApp* function is responsible to integrate *ui* and *server* functions. Additionally, we used leaflet library to get the map tiles and plot coordinates positions on the map. Application can be accessed using URL :- <https://makerapps.shinyapps.io/plane-hijack/>

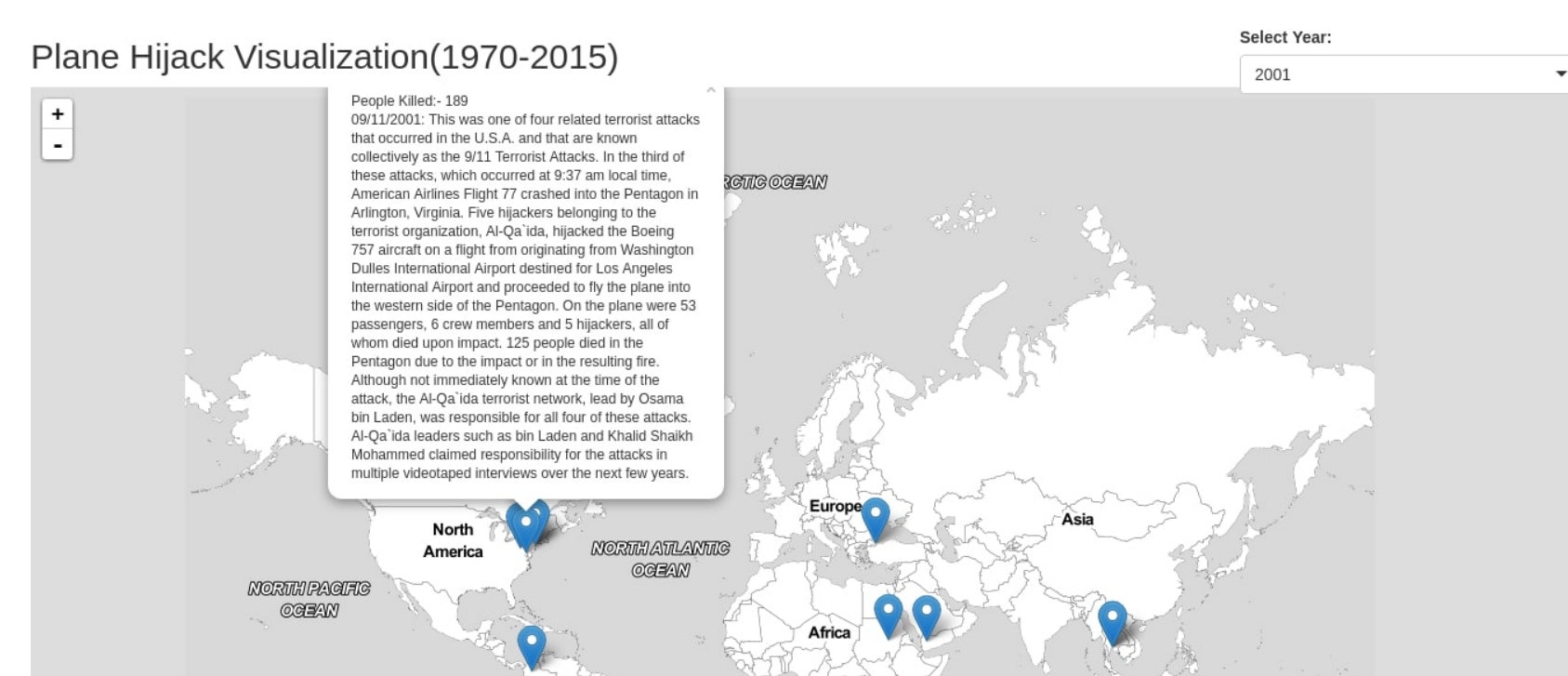


Figure 4: Terror attack showing infamous 9/11/2001 attack

Types of weapons used

In this section, we primarily visualize the kind of weapons that were used in the terror attacks. We divided entire dataset into two based on years, 1970 - 1999 and 2000 - 2015.

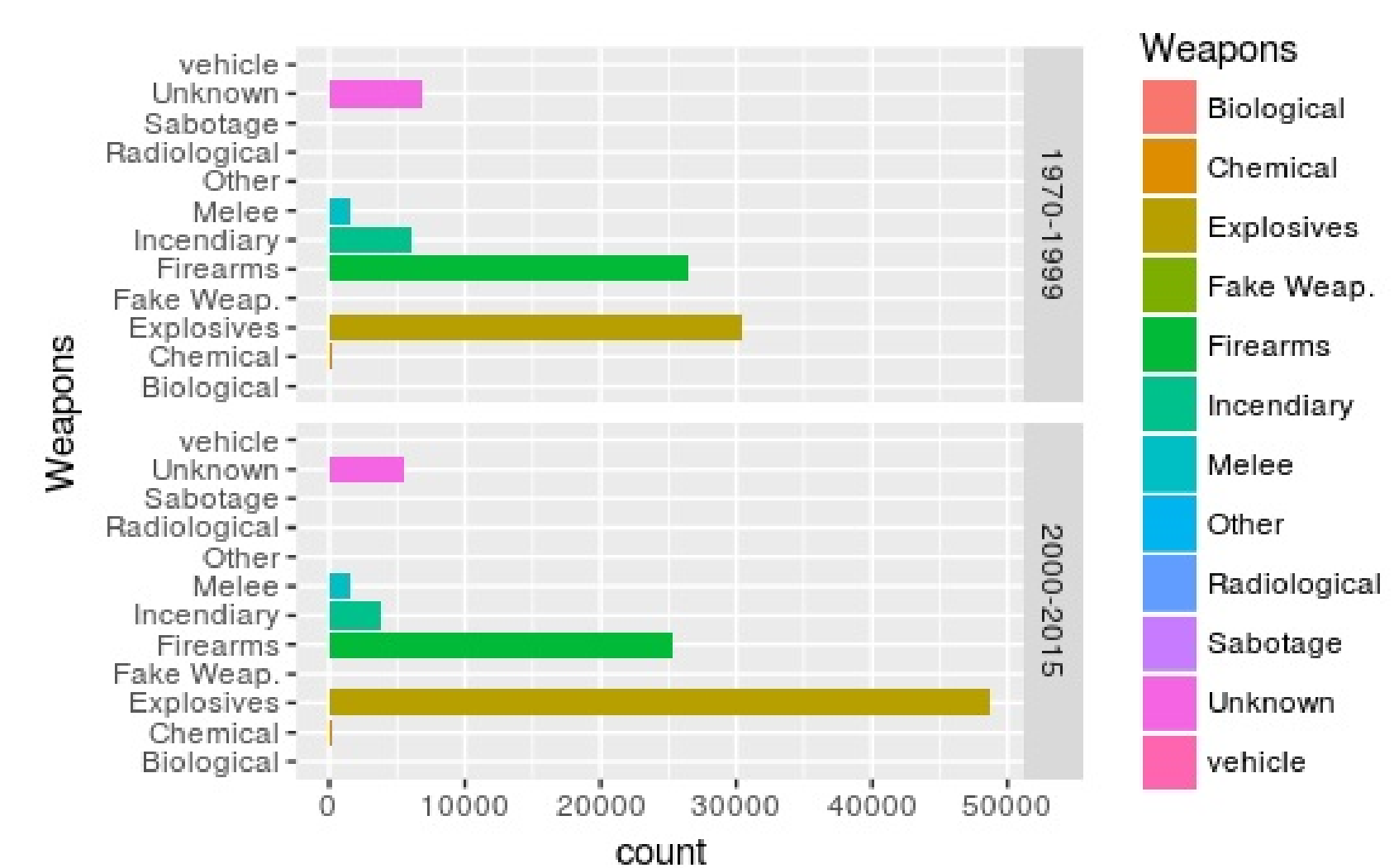


Figure 5: Weapon used in Terrorist attacks

In both the graphs, we see the use of explosives and firearms as the primary weapon type for most of the terrorist activities. Also, the use of explosives can be seen to have increased over the years and has a frequency of 50000; whereas we can see a decrease in the usage of firearms.

The prediction model

In this section, we mainly concentrate on the prediction model where we try to predict the success of terror attacks on the basis of fields such as *country*, *natty1*, *region*, *eventid*, *targtype1*, *weapsubtype1*, *nkill*, *nwound*, *attacktype1*, *weaptype1*, *multiple*, *property*, *uncertain1*, *doubtterr*, *crit3*, *ishostkid*, *ransom*, *suicide*, *crit1*.

We used the random forest method and built a prediction model that predicts the success of terror attacks using the important and affecting fields. We took 2014 data as our training set and 2015 data as testing data.

Figure 6 shows the parameters we used to rate our model.

Error	Precision	Recall	F-measure	Accuracy
2.880936	87.91328	86.09342	86.99383	97.11906

Figure 6: Values showing goodness of the model

Finally, we draw a ROC(Receiver Operating Characteristic) curve(Figure 7) to calculate the Area Under Curve(AUC) and the results look quite good as area under the curve covers 93.19 percent of plot area.

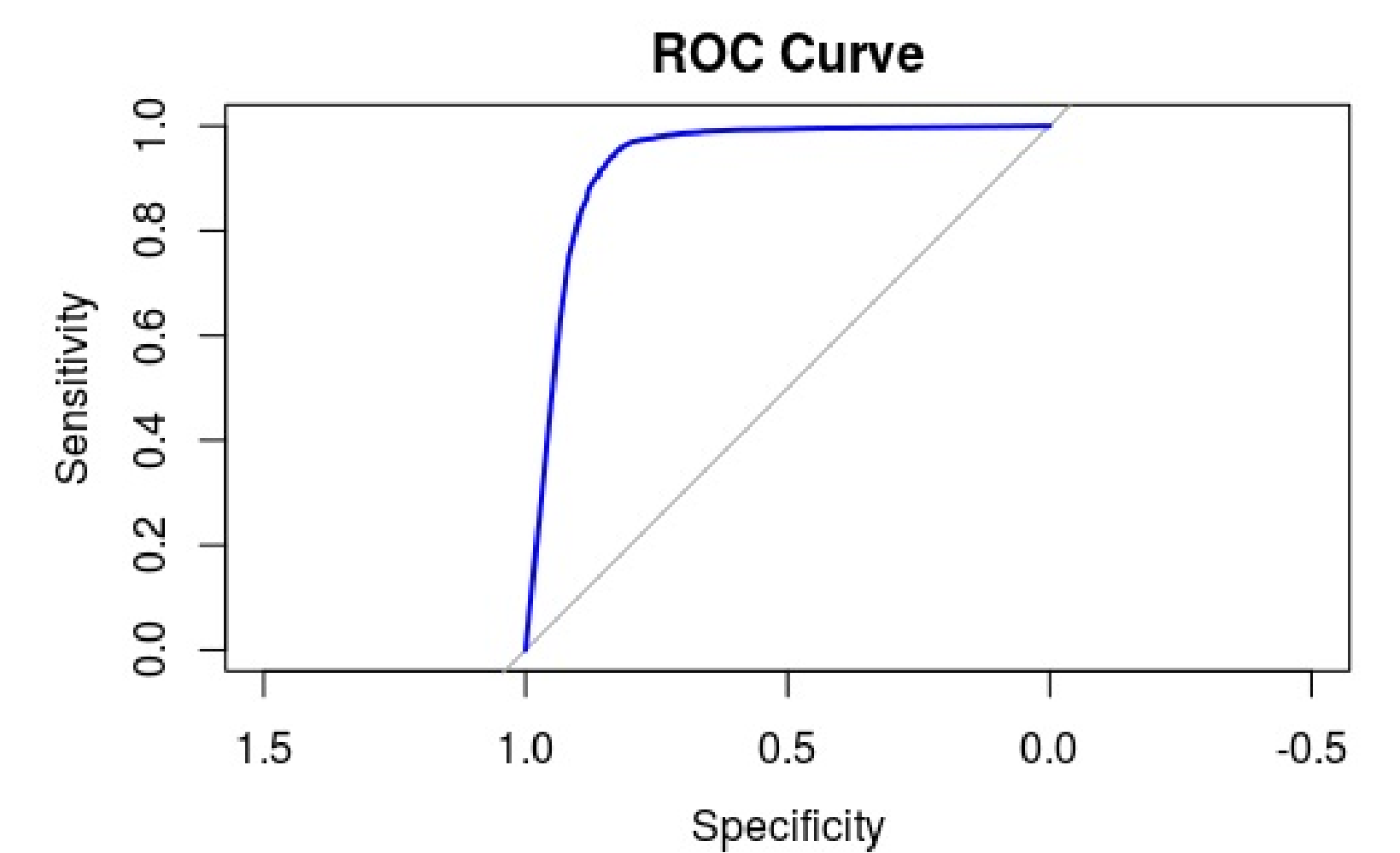


Figure 7: ROC with Area under the curve: 0.9319

Terrorism in India

From Figure 8, we aim to visualize the difference in the number of attacks during the years 1970-2015 in India. We can see that there were hardly any cases of terrorist attacks during the 1970s. However, there has been a significant increase in terrorist activities since then which is visible in the plot.

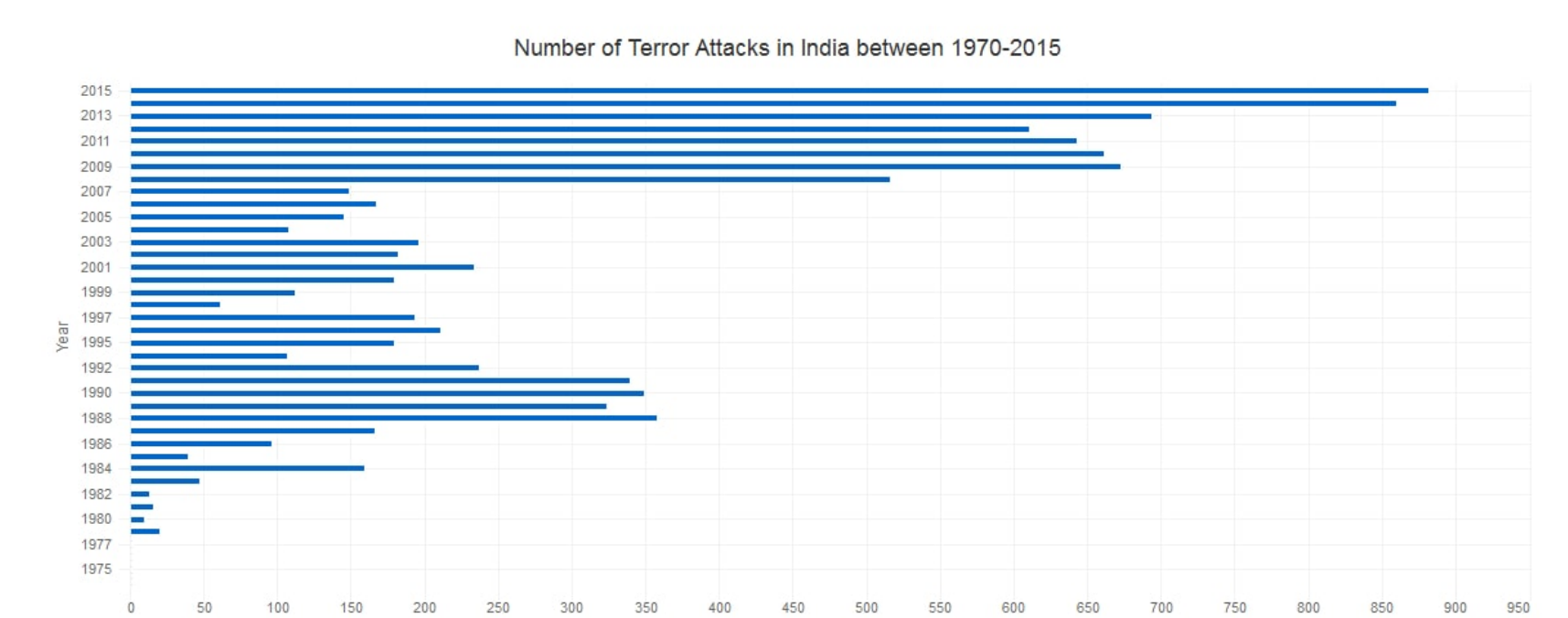


Figure 8: Development of Terrorism in India

Conclusion

After analyzing the data, we can conclude that there is no significant difference between the weapons used by terrorists for the years 1970 - 2015. The frequency of terrorist attacks has been increased in the last 15 years as compared to the years 1970 - 1999. Our prediction model works well with the data we already have to predict the "success of terror attacks". However, it is a challenge to get terrorist attacks data for future in order to predict the success of upcoming terrorist attacks. We also analyzed the HDI of the countries with highest number of terrorist attacks. It can be established that terrorism is not the only factor which is affecting HDI as there are countries with very low HDI and no cases of terrorism so far.

Project Source

The Rshiny code and configuration files can be found in Google drive[3].

References

- [1] GTD Team. Global terrorism database 1970-2016. <http://start.umd.edu/gtd/>, 2016.
- [2] UNITED NATIONS DEVELOPMENT PROGRAMME. Human development report. <http://hdr.undp.org/en/2016-report>, 2016.
- [3] Samreen M Hassan Abhishek Sonu, Manoj Kumar. Project source files. <https://drive.google.com/openid=0B1YP3SKQ3c8RbGxGbUY1R0Z2eTQ>, 2016.