

# Global Terrorism

**Berger Markus 01618005**

**Bognár Péter 1846044**

**Böröndy Ádam 01610133**

**Markus Sieder 01610682**



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# Terrorism

Berger Markus,  
Bognár Péter,  
Böröndy Ádam,  
Markus Sieder

# Goals

## Terrorism

- Questions to be answered:
  - Does unemployment influence terrorism within a country?
  - Does GDP per capita influence terrorism within a country?
  - Which economical and social influences have an influence terrorism?
  - What data is necessary to predict terrorism for the next year?

# Data

## Terrorism

- Global Terrorism Database (GTD) .csv
  - 1970 – 2017 (missing 1993)
  - More than 180.000 terrorist attacks
  - More than 100 variables on location, perpetrators, targets and outcome
- World Bank Data .xls
  - 1960 – 2018
  - GDP (total, per capita, per capita growth)
  - Unemployment
  - Life expectancy at birth



## Data Processing

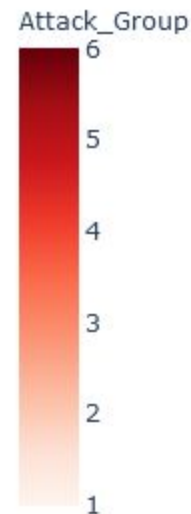
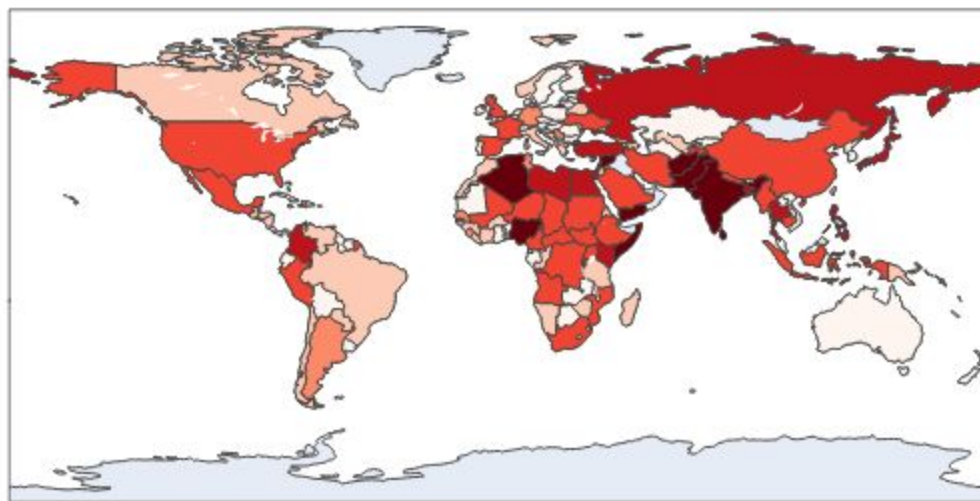
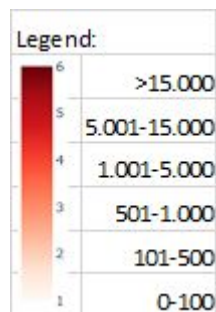
# Global Terrorism Database

- Processing
  - Calculating casualties (killed + wounded)
  - Removing years before 1992 (before that: different countries, bad reporting, etc.)
  - Renaming countries to official UN names
- Missing
  - Backwards interpolation for year 1993
- Outliers
  - Removing terrorist attacks with 350 or more killed
  - Not reasonable for analysis
  - (You can't predict 9/11!)

## Data Insights

# Terrorism

Terrorist attacks between 1991 and 2017



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## Data Insights

# Terrorism - Stats

	Killed		Wounded	Casualties
count	132106.000000	count	127936.000000	127537.000000
mean	2.493445	mean	3.601809	5.761167
std	12.278593	std	40.483276	47.147954
min	0.000000	min	0.000000	0.000000
25%	0.000000	25%	0.000000	0.000000
50%	1.000000	50%	0.000000	1.000000
75%	2.000000	75%	2.000000	5.000000
max	1570.000000	max	8191.000000	9574.000000

## Data Insights

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```
Number of Null values by column
Year          0
Month         0
Day           0
Country       0
Region        0
City          434
Latitude      2122
Longitude     2123
AttackType    0
Killed        4624
Wounded       8794
Target        257
Summary       22377
Group         0
Target_type   0
Weapon_type   0
Motive        87100
Casualties    9193
```

# Terrorism - Stats

## Weapon Types

```
Explosives          72179
Firearms            41736
Unknown             11155
Incendiary          7741
Melee               3249
Chemical            265
Vehicle (not to include vehicle-borne explosives, i.e., car or truck bombs) 125
Sabotage Equipment  112
Other               102
Fake Weapons        28
Biological           27
Radiological         11
Name: Weapon_type, dtype: int64
```

```
Bombing/Explosion   68067
Armed Assault       32666
Assassination       11271
Hostage Taking (Kidnapping) 9336
Facility/Infrastructure Attack 7508
Unknown             5993
Unarmed Assault     939
Hijacking            478
Hostage Taking (Barricade Incident) 472
Name: AttackType, dtype: int64
```

## Attack Types



## Data Insights

# Terrorism - Stats

### Terrorist Organization

Unknown	69298
Taliban	7478
Islamic State of Iraq and the Levant (ISIL)	5613
Al-Shabaab	3288
Boko Haram	2418

### Region / Country / City

Middle East & North Africa	46007
South Asia	41451
Sub-Saharan Africa	15282
Southeast Asia	10857
South America	7195
Western Europe	6788
Eastern Europe	5017
Central America & Caribbean	1620
North America	1265
Central Asia	563
East Asia	515
Australasia & Oceania	170

Iraq	24600	Baghdad	7570
Pakistan	14068	Unknown	7079
Afghanistan	12703	Karachi	2572
India	10359	Mosul	2262
Philippines	5546	Mogadishu	1559
...			

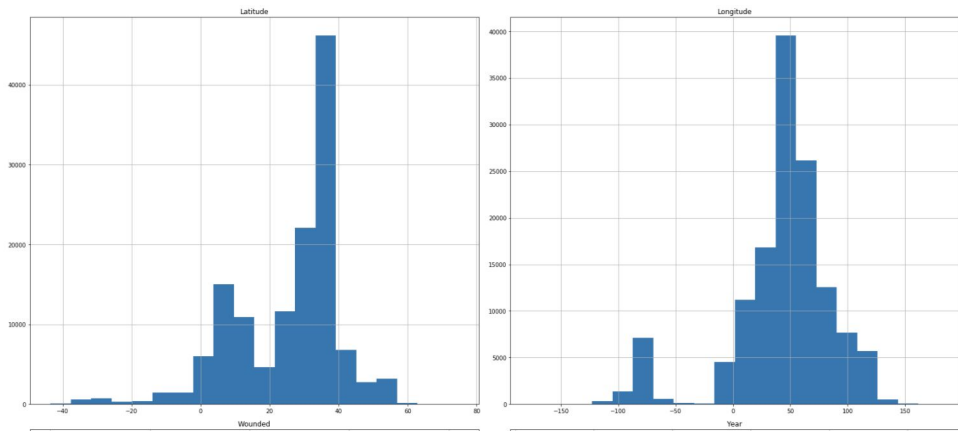
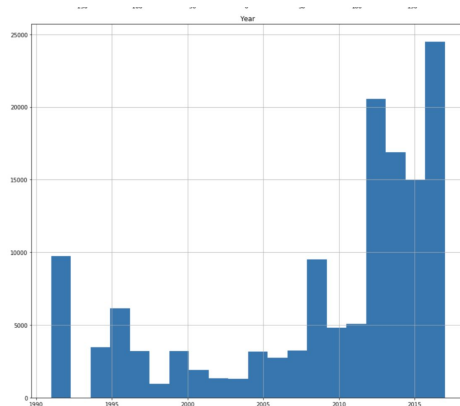
### Targets of Attack

Private Citizens & Property	36052
Military	20997
Police	19629
Government (General)	15513
Business	12842
Unknown	5586
Transportation	4582
Religious Figures/Institutions	3766
Educational Institution	3375
Utilities	3169
Terrorists/Non-State Militia	2616
Government (Diplomatic)	1997
Journalists & Media	1911
Violent Political Party	1544
NGO	839
Telecommunication	675
Airports & Aircraft	611
Tourists	334
Maritime	229
Food or Water Supply	188
Abortion Related	151
Other	124

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## Data Insights

# Terrorism - Stats



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## Data Insights

### Number of Null values by column

1990	45
1991	46
1992	46
1993	41
1994	39
1995	30
1996	30
1997	30
1998	28
1999	27
2000	20
2001	20
2002	15
2003	15
2004	14
2005	13
2006	13
2007	12
2008	13
2009	13
2010	13
2011	12
2012	13
2013	11
2014	12
2015	13
2016	14
2017	17

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# GDP - Stats

### GDP growth

CountryName	avg
Equatorial Guinea	14.383944
Nauru	13.441598
Bosnia and Herzegovina	10.811663
China	8.698387
Myanmar	7.664357
East Asia & Pacific (excluding high income)	7.063876
East Asia & Pacific (IDA & IBRD countries)	7.062827
Timor-Leste	6.199368
Iraq	5.683611
Lithuania	5.519613

### GDP/capita

CountryName	avg
Monaco	125432.680483
Liechtenstein	105002.775493
Cayman Islands	75463.629022
Luxembourg	75312.614917
Bermuda	61284.313495
Norway	59471.834794
San Marino	59009.555365
Switzerland	57601.354937
Channel Islands	51427.189627
Isle of Man	48600.155219

## Data Insights

# Life & Unemployment - Stats

	1990	2017
count	243.000000	245.000000
mean	64.733739	72.321203
std	9.498222	7.381138
min	33.413000	52.240000
25%	58.122400	67.380000
50%	67.860414	73.554000
75%	71.557000	77.632000
max	78.836829	84.680488

### Avg lifetime TOP 10

CountryName	avg
San Marino	85.417073
Cayman Islands	82.190244
Japan	81.598336
Hong Kong SAR, China	81.348258
Macao SAR, China	81.033893
Switzerland	80.657439
Iceland	80.600984
Italy	80.348780
Liechtenstein	80.318394
Sweden	80.217962

### Rate of Unemployment in %

CountryName	avg
North Macedonia	32.676260
Lesotho	31.541444
South Africa	27.949074
Bosnia and Herzegovina	25.213963
Montenegro	25.151741
Eswatini	24.670185
West Bank and Gaza	21.011111
Namibia	20.871296
St. Vincent and the Grenadines	20.133593
Algeria	18.951333



## Data Processing

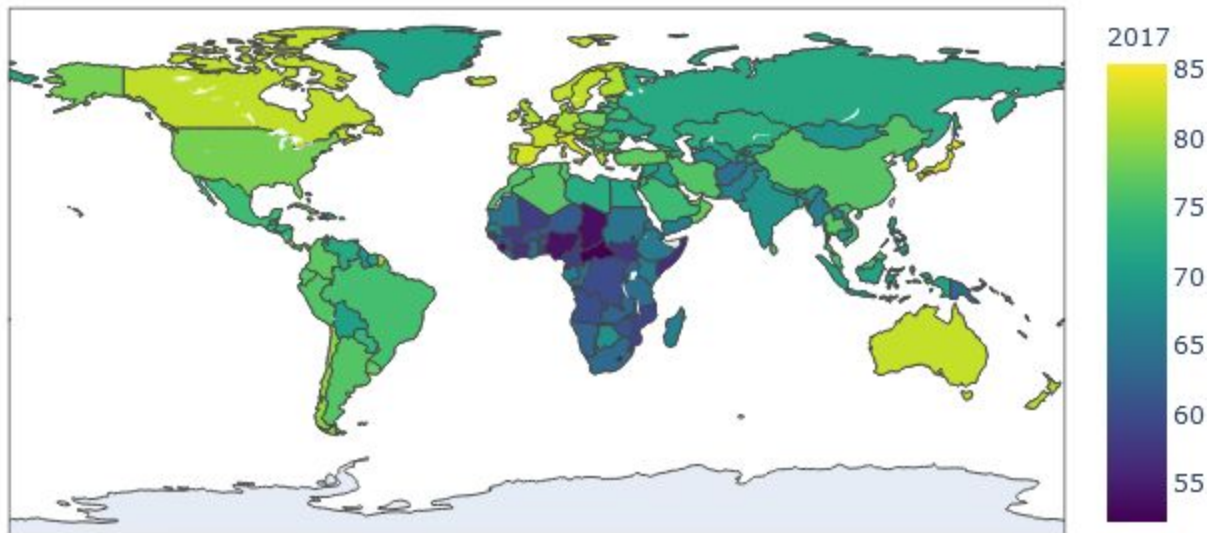
# World Bank Data

- Processing
  - Removing years before 1992 and after 2017
  - Computing average values for visualization
- Missing values
  - Interpolation by row (country)
- Combining with GTD
  - Dropping countries with no attacks
  - Small country Boolean (25 % quantile)
  - GDP in different forms (log, normalized, change in %)
  - Attacks and casualties (last 1, 3 and 5 years)
  - Terrorism (low, medium, high)

## Data Insights

# Life Expectancy in 2017

Life Expectancy in 2017

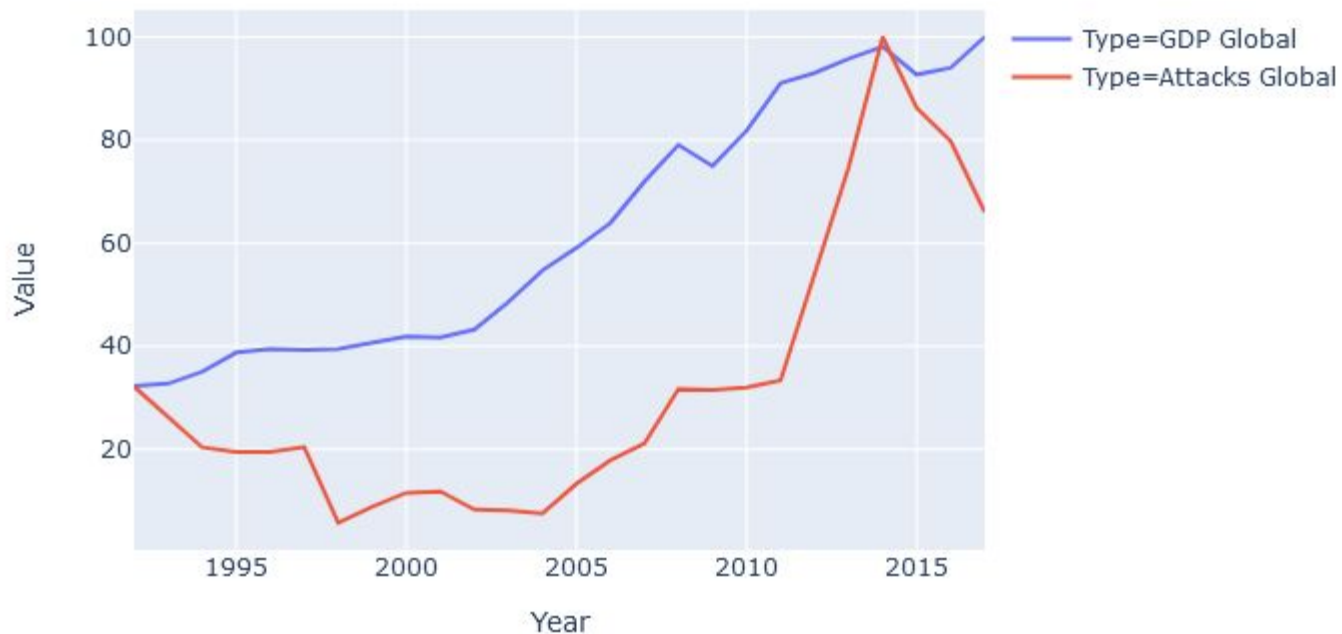


Berger Markus,  
Bognár Péter,  
Böröndy Ádam,  
Markus Sieder

## Data Insights

# Terrorism vs

GDP worldwide vs. Terrorist Attacks



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Bognár Péter,  
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## Data Insights

# Terrorism vs GDP

- Rise throughout recent year
- Heavy Increase in few countries
- Correlation != Casualty
- New Questions and Data



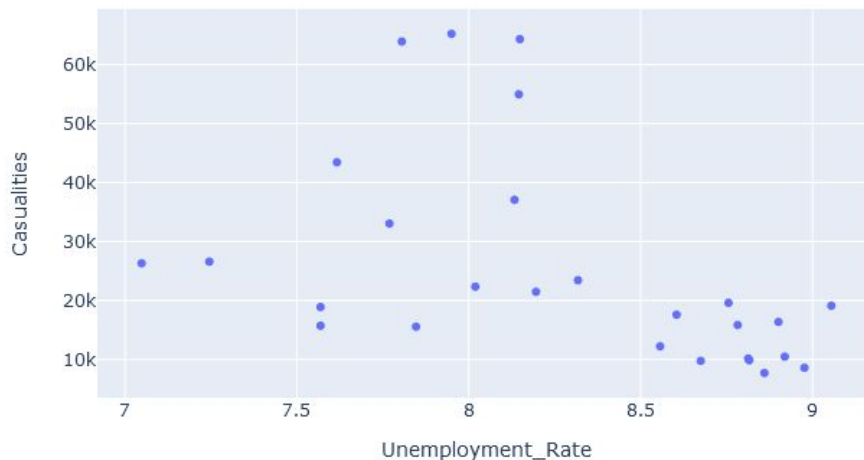
## Question Answering

# Does unemployment influence terrorism within a country?

- Correlation = -0.049
- Discarded

Predefined Correlation Levels	
No Correlation	$ \leq 0.3 $
Weak Correlation	$ 0.3  -  0.7 $
High Correlation	$>  0.7 $

Unemployment Rate vs. Casualties



## Question Answering

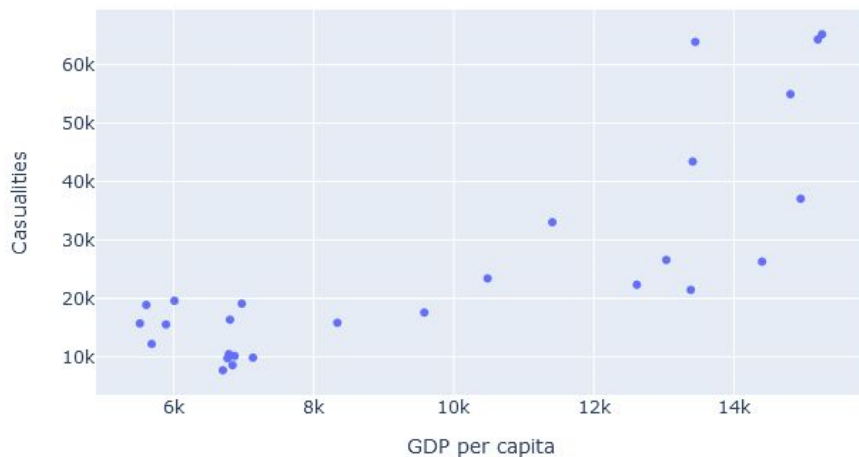
# Does GDP per capita influence terrorism within a country?

- Correlation = -0.10
- Discarded

### Predefined Correlation Levels

No Correlation	$ \leq 0.3 $
Weak Correlation	$ 0.3  -  0.7 $
High Correlation	$>  0.7 $

GDP per capita vs. Casualties



## Question Answering

# Which economical and social influences have impact on terrorism?

- Regression Coefficients (Ridge)

- Random Forest Importance

	Name	Coefficient	Importance
0	Small_Country	11.820833	0.001452
1	GDP_per_Capita	-687.210143	0.078652
2	GDP_log	102.939392	0.153349
3	GDP_normal	-51.018524	0.129080
4	GDP_change	1.736342	0.115881
5	Unemployment	-4.846505	0.211508
6	Life_Expectancy	-6.230563	0.227283
7	GDP_per_Capita_Change	0.358463	0.082796

- MAE

- 86 (Random Forest)
- 398 (Ridge Regression)

- RMSE

- 370 (Random Forest)
- 1330 (Ridge Regression)

## Question Answering

# What data is necessary to predict terrorism for the next year?

- Idea to include past terrorism activity
- Exclude outlier countries
- Improved Model
  - MAE [RF=39; Ridge=43]
  - RMSE [RF=91;Ridge=96]

	Name	Coefficient	Importance
0	Small_Country	11.874287	0.000910
1	GDP_per_Capita	-49.458150	0.051238
2	GDP_log	7.590417	0.038768
3	GDP_normal	-5.648192	0.038084
4	GDP_change	6.915617	0.052296
5	Unemployment	-0.495450	0.043991
6	Life_Expectancy	-0.250056	0.040650
7	GDP_per_Capita_Change	-0.214939	0.043338
8	Casualties_Last_Year	0.133783	0.589600
9	Casualties_Last_5_Years	0.224994	0.066311
10	Trend	0.380375	0.033698
11	High_Terrorism	56.672954	0.000558
12	Medium_Terrorism	-16.153055	0.000541
13	Low_Terrorism	-40.519899	0.000018

# **Any further Questions?**

**Thank you for your attention!**