Analysis of Online Learning During the COVID-19 Pandemic

By

AKPOTU EMMA ELOHO

REPORT ON PYTHON PROJECT

INTRODUCTION: The worldwide increase in COVID-19 cases in 2020 led to the closure of schools, colleges, and universities across nearly all regions, prompting a shift to online or remote learning. This transition has influenced student learning in various ways. The dataset captures web behavior related to online learning from different countries on a monthly basis, spanning from 2004 to 2021. Currently, it includes data from the 20 countries most severely impacted by COVID-19 during the dataset's development.

OBJECTIVES

- Populate the "Year" column by extracting the year information from the "Month" column.
- Summarize the dataset and group the data by the "Year" to facilitate analysis.
- Select three specific countries and determine the years in which online learning participation was at its lowest and highest for each of these countries.
- Use the Plotly library to create a line chart that visualizes the online learning trends over the years for the selected countries, including data labels on the chart for clarity.

These objectives ensure a structured approach to analyzing the dataset and visualizing the findings effectively.

DATA PROCESSING

Dataset Overview: The dataset encompasses monthly web behavior data regarding online learning, covering a timeline from January 2004 to December 2021. It provides insights into the online engagement of students in different countries during the pandemic. The selected countries for this analysis include Spain, Turkey, and Ukraine chosen for their distinct online learning experiences during this period.

Data Cleaning: The dataset was cleaned using python to load the dataset using pandas, display the columns, pre-process the dataset and check empty spaces.

Data Modelling: A new column was created (Year) to classify the data and to summarize the data. It was extracted from the existing "Month" column, facilitating a clearer year-wise analysis of the online learning metrics.

Data Analysis: A visualization line chart from plotly library was created to show the values on the chart. Identified the year with the highest and lowest
engagement data for each country. The data was then summarized by year, allowing for the identification of trends and patterns over time.

Year Extraction

```
[13]: data["Month"]=data["Month"].astype("datetime64[ns]")

[17]: data.insert(0,"Year",data["Month"].dt.to_period("Y"))

[19]: data
```

[19]:

	Year	Month	Argentina	Brazil	Colombia	France	Germany	India	Indonesia	Iran	...	Peru	Philippines	Poland	Russia	South Africa	Spain	Turkey	Ukraine
0	2004	2004-01-01	0	0	0	0	35	44	0	0	...	0	0	0	100	0	53	73	0
1	2004	2004-02-01	100	0	0	43	38	59	41	0	...	100	31	0	0	82	0	72	0
2	2004	2004-03-01	0	90	0	0	48	74	0	0	...	0	0	0	0	100	0	0	0
3	2004	2004-04-01	0	0	0	0	39	72	39	0	...	0	0	0	85	0	0	57	0
4	2004	2004-05-01	0	0	0	0	34	24	100	0	...	0	66	100	0	0	87	0	0
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
209	2021	2021-06-01	4	9	15	8	31	24	8	0	...	12	76	13	2	32	41	5	7

```
[79]: data.dtypes
```

```
[79]: Year                    period[Y-DEC]
      Month                   datetime64[ns]
```

Summary Statistics

summarized by year, allowing for the

identification of trends and patterns over time.

```
[23]: countries=["Spain","Turkey","Ukraine"]
      countries

[23]: ['Spain', 'Turkey', 'Ukraine']

[37]: total=data.groupby("Year")[countries].sum()
      total
```

[37]:

Year	Spain	Turkey	Ukraine
2004	275	382	0
2005	374	161	0
2006	140	88	0
2007	182	75	100
2008	270	47	109
2009	266	47	110
2010	261	34	35
2011	258	27	70
2012	405	30	68
2013	485	33	84
2014	352	34	55

SUMMARIZATION OF COUNTRIES AND YEAR

Determine the countries the years in which online learning participation was at its lowest and highest.

```
[59]: for country in countries:
          lowest_year=total[country].idxmin()
          highest_year=total[country].idxmax()
          lowest_value=total[country].min()
          highest_value=total[country].max()
          print(f"For {country}")
          print(f" Lowest year:{lowest_year} with a sum of {lowest_value}")
          print(f" highest year:{highest_year} with a sum of {highest_value}")
```

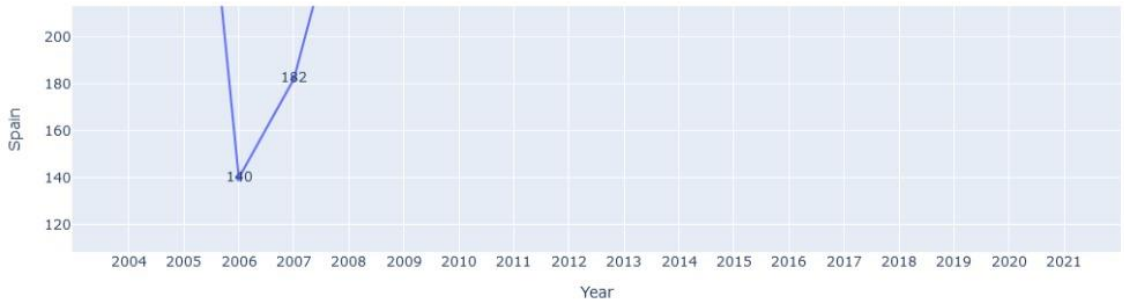
```
For Spain
 Lowest year:2006 with a sum of 140
 highest year:2020 with a sum of 546
For Turkey
 Lowest year:2011 with a sum of 27
 highest year:2004 with a sum of 382
For Ukraine
 Lowest year:2004 with a sum of 0
 highest year:2009 with a sum of 110
```

INSIGHTS

Spain

The analysis highlighted Spain as the country with the highest online learning metrics. Spain demonstrated a steady growth pattern, with a peak in 2020 with a total engagement of 546, likely influenced by the global shift to online learning during the COVID-19 pandemic. The lowest year was 2006 with an

```
]: px.line(country,x="Year",y="Spain",text="Spain")
```



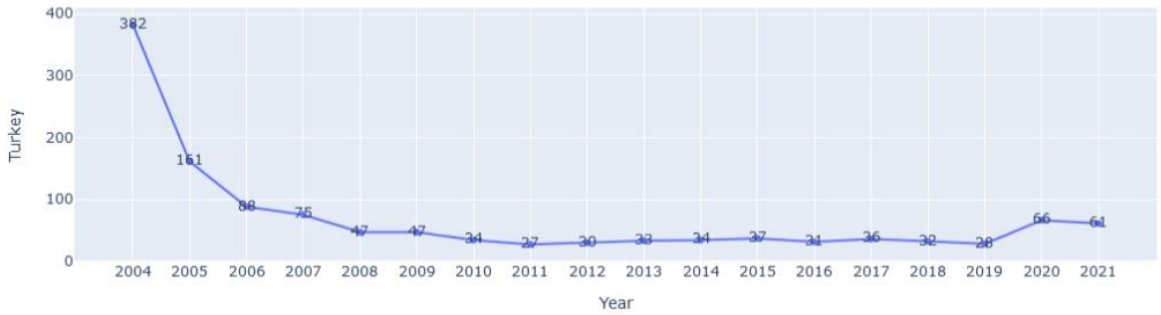
engagement of 140. This success can be attributed to effective government policies and robust educational frameworks that facilitated a smooth transition to remote learning.

Turkey

Turkey emerged with the second highest online learning metrics. Turkey demonstrated with a total engagement of 382 in 2004, which suggests a strong foundation for online learning, prior to the fluctuations observed during the pandemic.

In 2011, Turkey experienced a notable decline in online learning engagement with a total sum of 27, which could be linked to the transition back to traditional educational methods.

```
px.line(country2,x="Year",y="Turkey",text="Turkey")
```

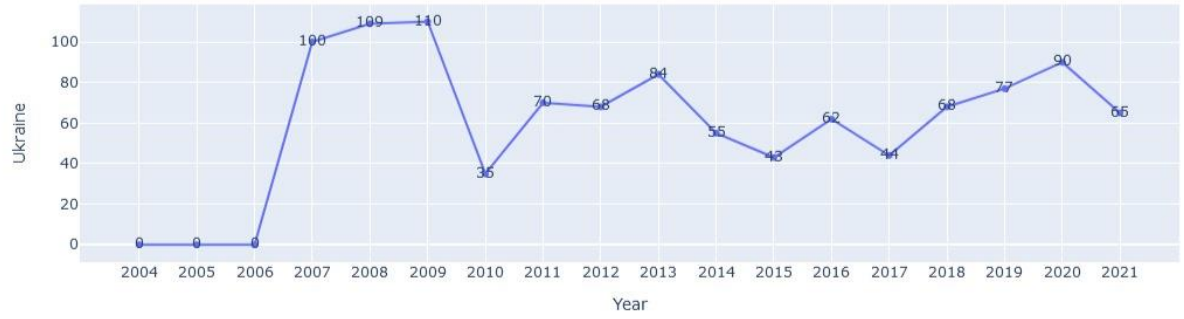


Ukraine

Ukraine faced significant challenges, which led to a total engagement of 110 in 2009 and a decline of 0 in 2004,2005 and 2006 resulting in the lowest online learning metrics among the countries analyzed. Issues such as limited access to reliable

internet and technological resources hindered students' ability to engage effectively in online learning, revealing critical gaps that need to be addressed.

```
px.line(country3,x="Year",y="Ukraine",text="Ukraine")
```



VISUALIZATION LINE CHART FROM PLOTLY LIBARY

```
from plotly.offline import init_notebook_mode
import cufflinks as cf
cf.go_offline()
```

```
total.iplot(kind='line',xTitle='Year',yTitle='Total Online Learning')
```

SUMMARY

This analysis of online learning trends during the COVID-19 pandemic reveals significant variations in how different countries adapted to the challenges posed by remote education. Spain stands out as a leader in effective online learning implementation, while Turkey also made commendable strides. In contrast, Ukraine's experience highlights the urgent need for improved infrastructure and resources to support equitable access to education. These insights can inform future educational strategies, ensuring that lessons learned during this period are applied to enhance online learning for all students.

RECOMMENDATION

- Effective government policies and robust educational frameworks that facilitated a smooth transition to remote learning.
- Implementation of various initiatives to support online education, including training for teachers and enhanced access to digital resources, which will positively impact student engagement.
- Ensuring access to diverse study resources including group project and collaborative learning to engage effectively in online learning.

THANK YOU….