

IBM HackChallenge 2023

Team Name	:	Analytic Architects
Team Size	:	4
Bussiness Challenge	:	Malnutrition: A Disease That no one cares about

Description:

Create a comprehensive web application aimed at addressing malnutrition through diagnosis and analysis. The website will utilize IBM Cognos tools for data analysis and visualization. The main focus of the website is to help users to understand the reasons behind malnutrition, and receive personalized solutions. Additionally, the website will be capable of generating visual analytical representations on malnutrition across different countries.

STEP BY STEP PROCEDURE:

1.DATA COLLECTION:

For this project, data collection was a crucial initial step, involving the acquisition of datasets from the Kaggle website. The datasets were sourced from the link <https://www.kaggle.com/datasets/ruchi798/malnutrition-across-the-globe>.

The provided datasets hold valuable information regarding malnutrition across different countries. Two specific datasets were gathered: "country-wise-average" and "malnutrition-estimates."

Country-wise Average Dataset:

The "country-wise-average" dataset contains aggregated information about various indicators and measures related to malnutrition across different countries. This dataset presents a comprehensive overview of malnutrition trends, including key statistics averaged at the country level. It encompasses aspects such as child stunting, wasting, underweight rates, and other relevant metrics.

Country-wise Average Dataset:

	A	B	C	D	E	F	G	H	I
1	Country	Income Classification	Severe Wasting	Wasting	Overweight	Stunting	Underweight	U5 Population ('000s)	
2	AFGHANISTAN	0	3.033333333	10.35	5.125	47.775	30.375	4918.5615	
3	ALBANIA	2	4.075	7.76	20.8	24.16	7.7	232.8598	
4	ALGERIA	2	2.733333333	5.942857143	12.83333333	19.57142857	7.342857143	3565.213143	
5	ANGOLA	1	2.4	6.933333333	2.55	42.63333333	23.6	3980.054	
6	ARGENTINA	2	0.2	2.15	11.125	10.025	2.6	3613.65175	
7	ARMENIA	2	1.6	3.94	13.62	16.12	3.48	204.1452	
8	AUSTRALIA	3	0	0	13.875	1	0.1	1443.0745	
9	AZERBAIJAN	2	2.575	5.433333333	9.183333333	21.81666667	8.083333333	740.5016667	
10	BAHRAIN	3		6.7	7.5	13.75	6.95	63.371	
11	BANGLADESH	1	2.813636364	14.5375	0.9625	54.22916667	46.26666667	15837.4275	
12	BARBADOS	3	2	6.8	12.2	7.7	3.5	16.653	
13	BELARUS	2	0.6	2.2	9.7	4.5	1.3	445.676	
14	BELIZE	2	0.833333333	2.333333333	9.6	18.76666667	5.3	36.1045	
15	BENIN	0	2.425	7.7	2.275	35.375	20.125	1476.52575	
16	BHUTAN	1	1.4	4.525	5.1	44.25	17.8	74.79675	
17	BOLIVIA (PLURINATIONAL STATE OF)	1	0.7	1.9	8.6	29.72857143	7.472727273	1104.222182	
18	BOSNIA AND HERZEGOVINA	2	2.2	4.566666667	19.8	10.93333333	2.466666667	194.1566667	
19	BOTSWANA	2	2.85	8.8	10.05	31.03333333	12.66666667	226.709	
20	BRAZIL	2	0.7	2.3	6.25	13.13333333	3.925	17071.496	
21	BRUNEI DARUSSALAM	3	0.4	2.9	8.3	19.7	9.6	31.337	
22	BULGARIA	2	1.533333333	4.666666667	9	7.466666667	2	344.0373333	
23	BURKINA FASO	0	4.169230769	12.73076923	2.25	33.34615385	25.07692308	2796.190615	
24	BURUNDI	0	1.26	6.666666667	1.775	57.6	32.25	1497.888	
25	CABO VERDE	1		5.55		24.1	12.75	60.583	
26	CAMBODIA	1	3.483333333	11.46666667	3.033333333	43.68333333	31.98333333	1651.662167	
27	CAMEROON	1	1.814285714	5.671428571	8.042857143	33.74285714	14.68571429	3170.714286	
28	CANADA	3			10.4			1697.603	
29	CENTRAL AFRICAN REPUBLIC (THE)	0	3.16	8.766666667	5.38	41.78333333	23.36666667	673.2005	
30	CHAD	0	5.5	15.24	3.04	41.26	31.4	2024.2904	
31	CHILE	3		0.466666667	11.31333333	3.453333333	0.746666667	1303.080133	

Malnutrition Estimates Dataset:

The "malnutrition-estimates" dataset comprises more detailed estimates and figures related to malnutrition. This dataset might encompass variables like socioeconomic factors, access to healthcare, dietary patterns, and environmental factors. Analyzing this dataset can provide a deeper understanding of the complex interplay between various factors and malnutrition rates.

Malnutrition Estimates Dataset:

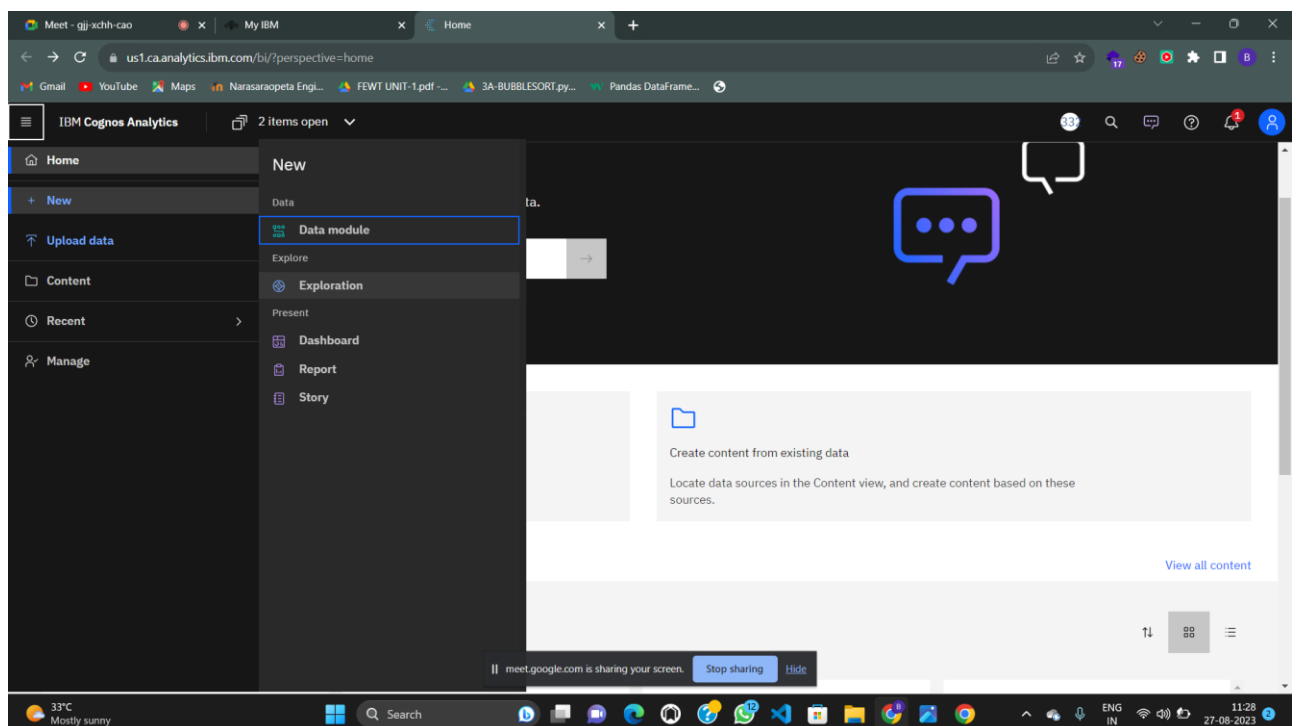
	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T						
1	ISO cod	Country	Survey Year	Year	Income Classification	LDC	LIFD	LLDC or SID2	Survey Sample (N)	Severe Wasting	Wasting	Overweight	Stunting	Underweight	Notes	Report Author	Source	Short Sour	U5 Population ('000s)						
2	AFG	AFGHANISTAN	1997	1997		0	1	1	1	4,846		18.2	6.5	53.2	44.9	Converted est	CIET International	Afghanista	MICS	3838.877					
3	AFG	AFGHANISTAN	2004	2004		0	1	1	1	946	3.5	8.6	4.6	59.3	32.9		Ministry of Public Health Summary	r	NNS	4789.353					
4	AFG	AFGHANISTAN	2013	2013		0	1	1	1	44,26,469	4	9.5	5.3	40.4	24.6		Ministry of Public Health	Afghanista	SMART	5444.573					
5	AFG	AFGHANISTAN	2018	2018		0	1	1	1		1.6	5.1	4.1	38.2	19.1		KIT Royal Tropical Institi	Afghanista	Other	5601.443					
6	ALB	ALBANIA	1996-98	1997		2	0	0	0	7,642		8.1	9.5	20.4	7.1	Converted est	Institute of Public Health	National s	Other	309.225					
7	ALB	ALBANIA	2000	2000		2	0	0	0	1,382	6.2	12.2	30.1	39.2	17		National Institute of Sta	Multiple in	MICS	279.835					
8	ALB	ALBANIA	2005	2005		2	0	0	0	1,090	3.7	7.3	24.8	26.7	6.6		Albanian National Institi	Albania m	MICS	219.405					
9	ALB	ALBANIA	2008-09	2009		2	0	0	0	1,489	5.9	9.6	23.2	23.2	6.3		Institute of Statistics, Ins	Albania de	DHS	179.312					
0	ALB	ALBANIA	2017-18	2017		2	0	0	0	2,367	0.5	1.6	16.4	11.3	1.5		Institute of Statistics, Ins	Albania De	DHS	176.522					
1	DZA	ALGERIA	1987	1987		2	0	0	0	2,344		4		16.9	8	Converted est	Institut National de Sant	Etat nutriti	Other	3955.087					
2	DZA	ALGERIA	1992	1992		2	0	0	0	4,629	3	7.1	8.7	22.9	9.2		RÃ©publique AlgÃ©rien	EnquÃªte / PAPFAM		3926.354					
3	DZA	ALGERIA	1995	1995		2	0	0	0	3,825	4.2	9.6	13.2	22.5	11.3		MinistÃ©re de la SantÃ©	EnquÃªte / MICS		3733.161					
4	DZA	ALGERIA	2000	2000		2	0	0	0	4,178	1.1	3.1	14.7	23.6	5.4		MinistÃ©re de la SantÃ©	EnquÃªte / MICS		3084.85					
5	DZA	ALGERIA	2002	2002		2	0	0	0	4,357	5	9.6	15.1	24	11.1		MinistÃ©re de la SantÃ©	EnquÃªte / PAPFAM		2877.72					
6	DZA	ALGERIA	2006	2006		2	0	0	0	13,885	1.7	4.1	12.9	15.4	3.4		MinistÃ©re de la SantÃ©	© Suivi de la MICS		3080.573					
7	DZA	ALGERIA	2012-13	2012		2	0	0	0	13,860	1.4	4.1	12.4	11.7	3		MinistÃ©re de la SantÃ©	RÃ©public MICS		4298.747					
8	AGO	ANGOLA	1996	1996		1	1	0	0	1,534	1.8	7.7	1.7	61.1	36.2		Instituto Nacional de Est	Inquerito c	MICS	2749.75					
9	AGO	ANGOLA	2007	2007		1	1	0	0	10,224	4.3	8.2		29.2	15.6		Ministerio da Saude. Relatorio	c	Other	3998.054					
0	AGO	ANGOLA	2015-16	2015		1	1	0	0	7,468	1.1	4.9	3.4	37.6	19		Instituto Nacional de Est	InquÃ©rito	DHS	5192.358					
1	ARG	ARGENTINA	1994	1994		2	0	0	0	5,296		1.6	11.1	7.1	1.7	Converted est	Lejarraga H, Krupitzky S,	The organi	Other	3579.943					
2	ARG	ARGENTINA	1995-96	1996		2	0	0	0	91,943		4.2	13.5	16.9	4.7	Converted est	Calvo EB, Longo EN et al	Encuesta e	Other	3574.466					
3	ARG	ARGENTINA	2004-05	2005		2	0	0	0	9,99,999	0.2	1.2	9.9	8.2	2.3		DurÃ¡n P, Mangialavori c	Nutrition s	Other	3558.316					
4	ARG	ARGENTINA	2018-19	2019		2	0	0	0			1.6	10	7.9	1.7	overweight us	Ministry of Health and E	Segunda E	Other	3741.882					
5	ARM	ARMENIA	1998	1998		2	0	0	1	3,241	1	3.3	10.8	15.1	2.7		National Institute of Nul	The health	Other	222.626					
6	ARM	ARMENIA	2000-01	2000		2	0	0	1	1,486	0.7	2.5	15.7	17.3	2.6		National Statistical Servi	Armenia d	DHS	196.554					
<	>	malnutrition-estimates			+															:	<				

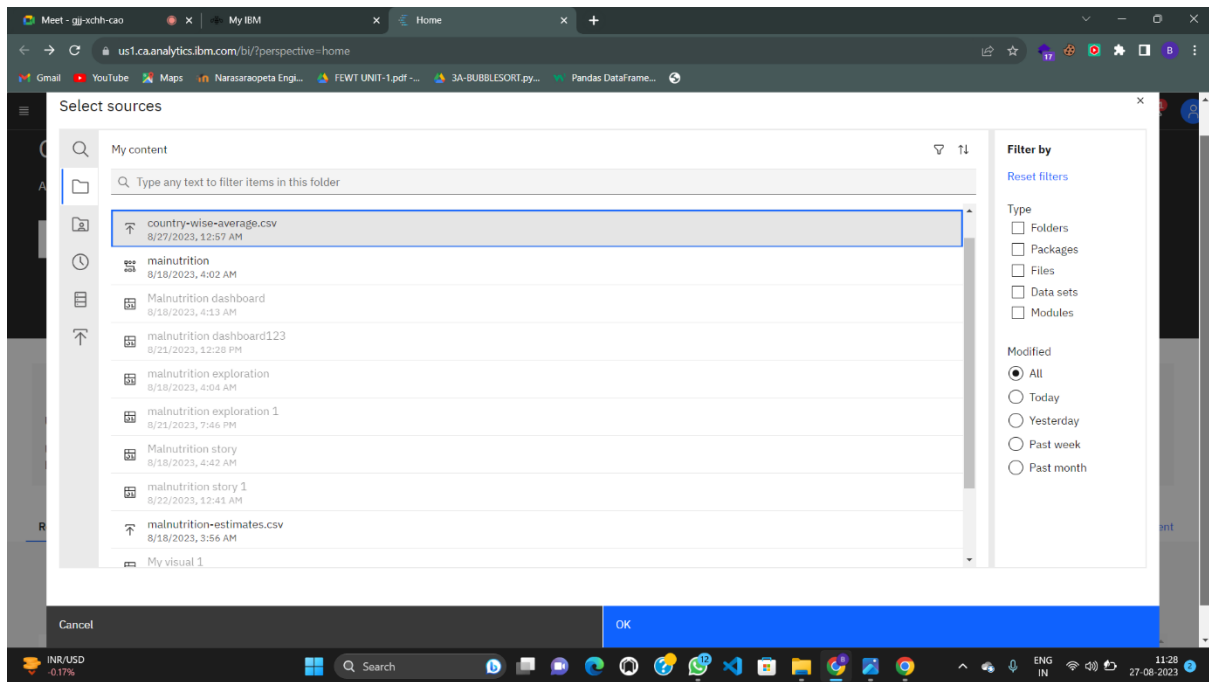
By collecting and utilizing these datasets, the project gains a robust foundation for conducting comprehensive analyses and deriving meaningful insights into the global malnutrition situation.

After completing the data collection phase and obtaining the relevant datasets, the next step in your project involved creating a data module in IBM Cognos. Let's delve deeper into what this entails:

Creating a Data Module:

1. **IBM Cognos:** IBM Cognos is a robust business intelligence and analytics platform that provides tools for data visualization, reporting, and analysis. It allows users to transform raw data into actionable insights through various components, one of which is the data module.
2. **Data Module:** A data module in IBM Cognos is a powerful tool that facilitates data integration, exploration, and modeling. It provides a user-friendly interface for users to interact with data sources, combine data from different sources, and create a unified view for analysis.





2.DATA PREPARATION:

In the data preparation phase of the project, our focus was on refining the collected datasets, "country-wise-average" and "malnutrition-estimates," through the application of essential data preprocessing techniques. One of the critical steps we took was addressing the issue of missing data or null values within the datasets.

1.Handling Missing Data:

Missing data can significantly impact the quality and reliability of any analysis. To ensure the integrity of our results, we employed a method to handle missing values within the datasets. Specifically, we adopted the approach of replacing the null values with the average value of the respective column.

Null Value Replacement Strategy:

For each column containing missing values, we calculated the average of the non-missing data within that column. This average value was then used to replace the missing values. This approach is known to provide a reasonable estimation while minimizing potential distortions introduced by incomplete data.

The screenshot shows the IBM Cognos Analytics interface. On the left, the 'Data module' pane lists a dataset named 'country-wise..._average_dataset'. The main area displays a table with the following columns: Country, Income Classification, Severe Wasting, Wasting, Overweight, and Stunting. A context menu is open over the table, showing options like Calculation, Filter, Folder, Table, etc. The table data is as follows:

Country	Income Classification	Severe Wasting	Wasting	Overweight	Stunting
AFGHANISTAN	0	3.033333333333333	10.35	5.125	47.775000000
ALBANIA	2	4.075	7.76	20.8	24.16
ALGERIA	2	2.733333333333333	5.942857142857143	12.833333333333334	19.571428571
ANGOLA	1	2.4	6.933333333333333	2.55	42.633333333
ARGENTINA	2	0.2	2.1500000000000004	11.125	10.025
ARMENIA	2	1.6	3.94	13.62	16.119999999
AUSTRALIA	3	0	0	13.875	1
AZERBAIJAN	2	2.5749999999999997	5.433333333333334	9.183333333333334	21.816666666
BAHRAIN	3	Null	6.699999999999999	7.5	13.75
BANGLADESH	1	2.813636363636364	14.5375	0.9625000000000002	54.229166666
BARBADOS	3	2	6.8	12.2	7.7
BELARUS	2	0.6	2.2	9.7	4.5
REF IZE	2	0.8333333333333334	2.333333333333333	9.6	18.766666666

Data Preparation in IBM Cognos: Replacing Null Values with Column Averages

- Identifying Null Values:** During your data exploration phase within IBM Cognos, you likely identified columns within your datasets that contained missing or null values. These missing values could potentially disrupt the accuracy and reliability of any subsequent analysis.
- Null Value Replacement Strategy:** To address the issue of null values, you implemented a method to replace these missing entries with the average value of their respective columns. This approach involves calculating the average of the non-null values within a column and then using that average to fill in the missing entries.

My IBM

us1.ca.analytics.ibm.com/bi/?perspective=ca-modeller&id=IB40EA15ADEE54F67A1301E6E1F20C26C&objRef=IB40EA15ADEE54F67A1301E6E1F20C26C&tid=2159784894_8dfff...

IBM Cognos Analytics

Create calculation

Name: C_Severe Wasting

Components

- country-wise...age_dataset
 - country-wise...erage.csv
 - # Row Id
 - Country
 - Income Classification
 - Severe Wasting
 - Wasting
 - Overweight
 - Stunting
 - Underweight
 - US Popul... ('000s)

Expression

```
1 average ( Severe_Wasting )
```

Preview (Execution time: 1.158 seconds)

C_Severe Wasting	Severe Wasting
2.1686496950730985	3.033333333333333
2.1686496950730985	4.075

Calculate after aggregation

Cancel OK

33°C Mostly sunny

Search

27-08-2023 11:34

My IBM

us1.ca.analytics.ibm.com/bi/?perspective=ca-modeller&id=IB40EA15ADEE54F67A1301E6E1F20C26C&objRef=IB40EA15ADEE54F67A1301E6E1F20C26C&tid=2159784894_8dfff...

IBM Cognos Analytics

Data module

Grid Relationships Custom tables

country-wise...age_dataset

- Navigation paths
- country-wise...erage.csv
 - C_Wasting
 - C_Severe Wasting
- # Row Id
- Country
- Income Classification
- Severe Wasting
- Wasting
- Overweight
- Stunting
- Underweight
- US Population ('000s)

Clean - Wasting

NULL values

☐ Replace this value with NULL

☒ Replace NULL values with 6.5992571243

Cancel Clean

Row Id	Country	Income Classification	Severe Wasting	Wasting	Overweight	Stunting
75 1			3.03333333	10.35	5.125	47.77500
75 2			7.76	20.8		24.16
75 3			5.942857142857143	12.833333333333334	19.57142	
75 4			6.933333333333333	2.55	42.63333	
75 5			2.1500000000000004	11.125	10.025	
75 6			3.94	13.62	16.11999	
75 7			0	13.875	1	
75 8			5.433333333333334	9.183333333333334	21.81666	
75 9	BAHRAIN	3	2.168649695	6.699999999999999	7.5	13.75
75 10	BANGLADESH	1	2.813636363636364	14.5375	0.9625000000000002	54.22916
75 11	BARBADOS	3	2	6.8	12.2	7.7
75 12	BELARUS	2	0.6	2.2	9.7	4.5
75 13	REF IZE	2	0.8333333333333334	2.333333333333333	9.6	18.76666

33°C Mostly sunny

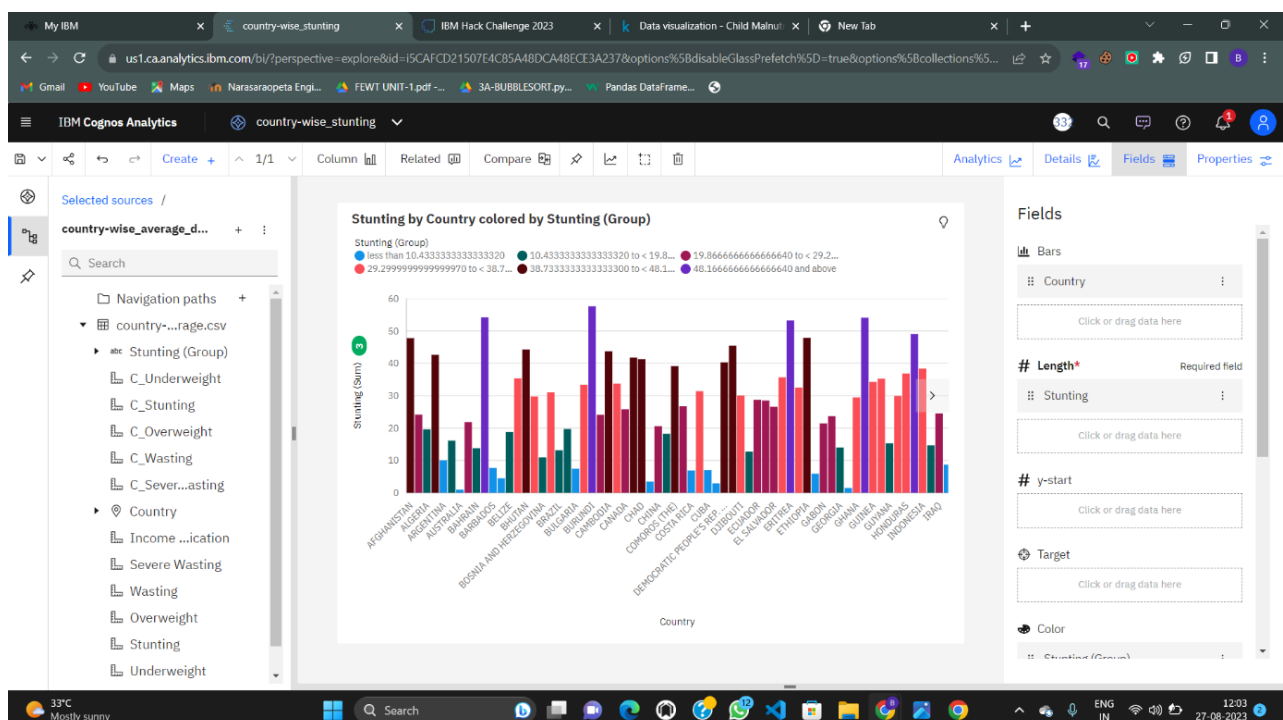
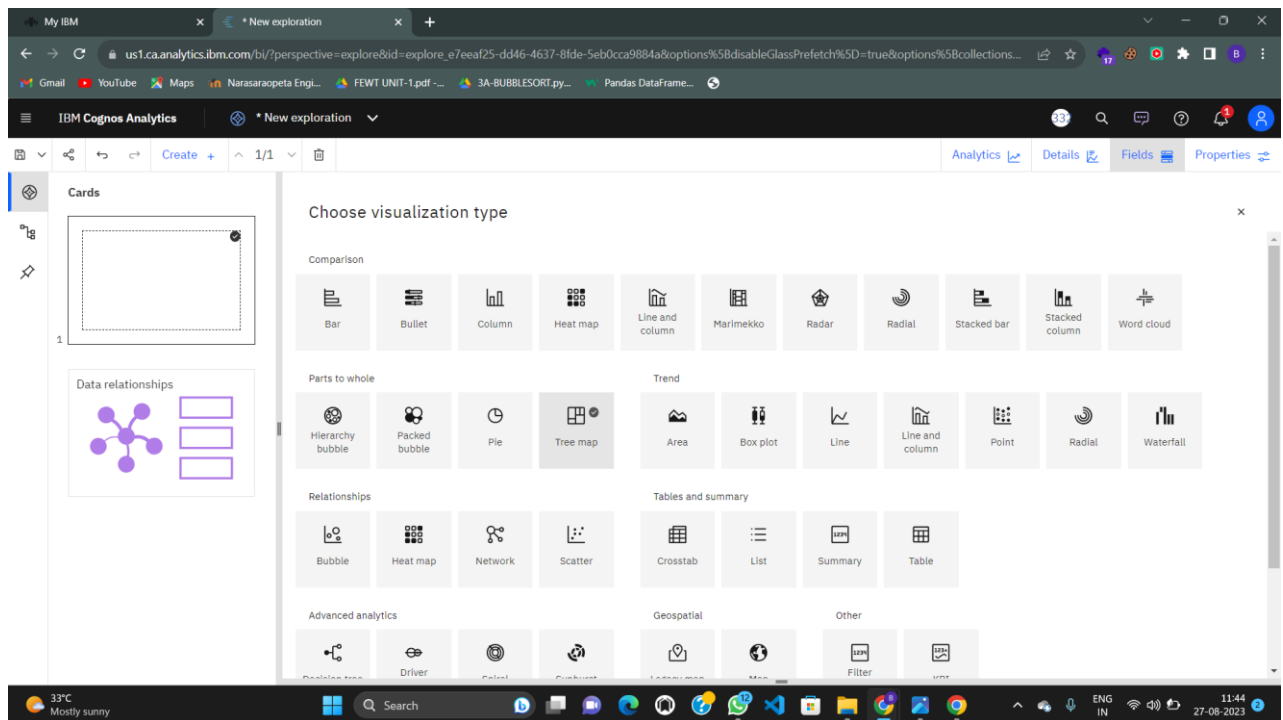
Search

27-08-2023 11:37

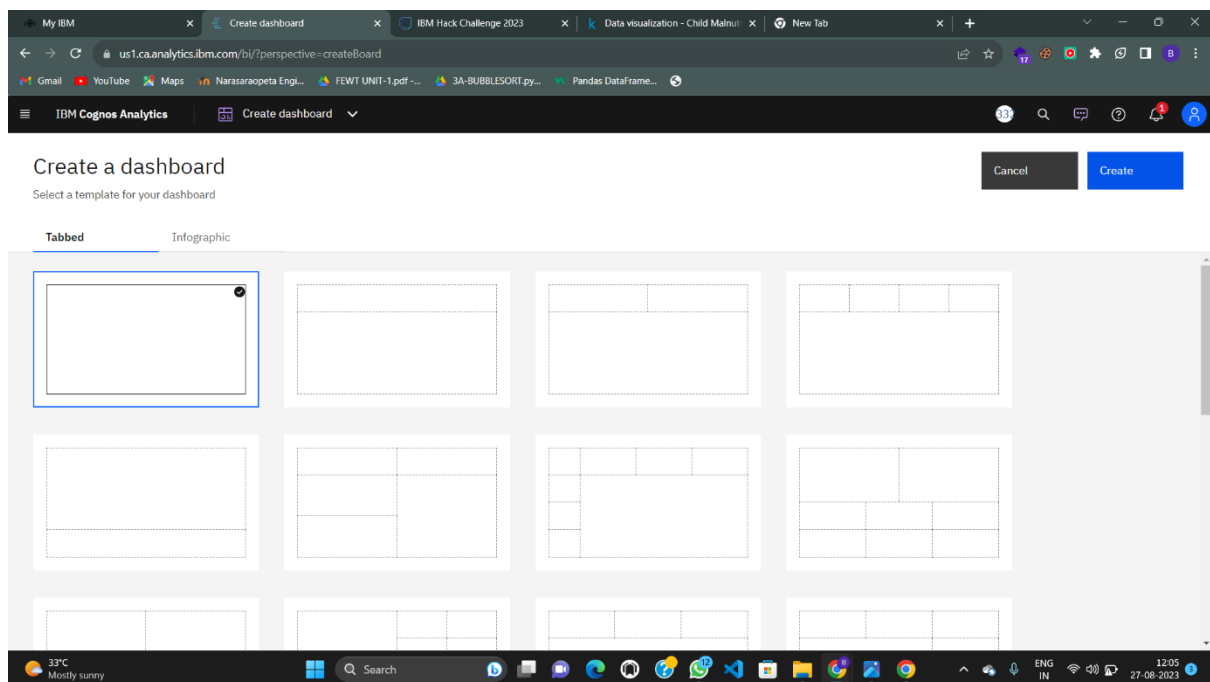
3.Data Visualization:

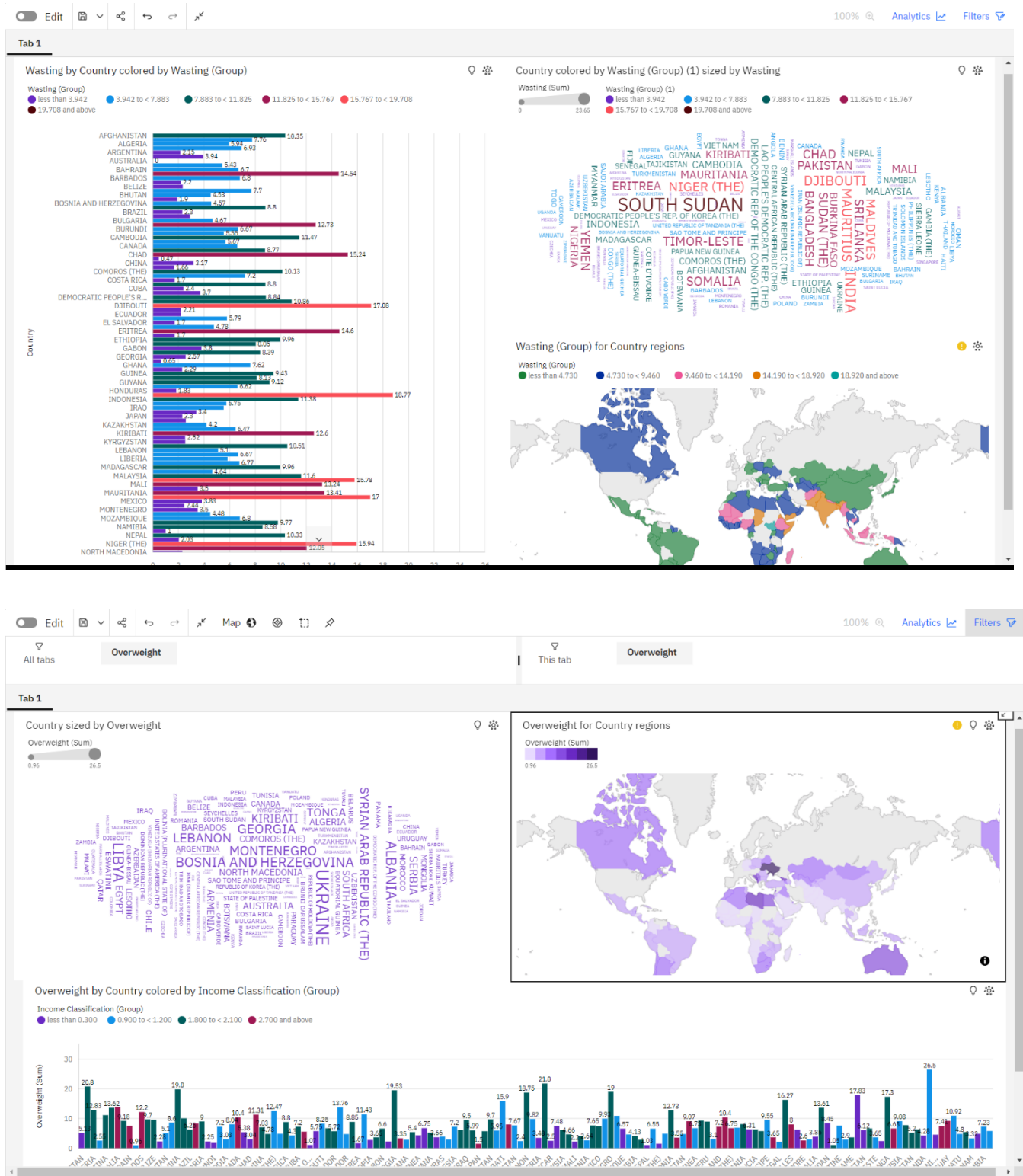
Data Visualization: Creating Dashboards, Stories, and Reports

In the data visualization phase of your project, you leveraged the capabilities of IBM Cognos to create compelling and informative visualizations that convey insights from your malnutrition datasets. Here's an overview of the components you developed:



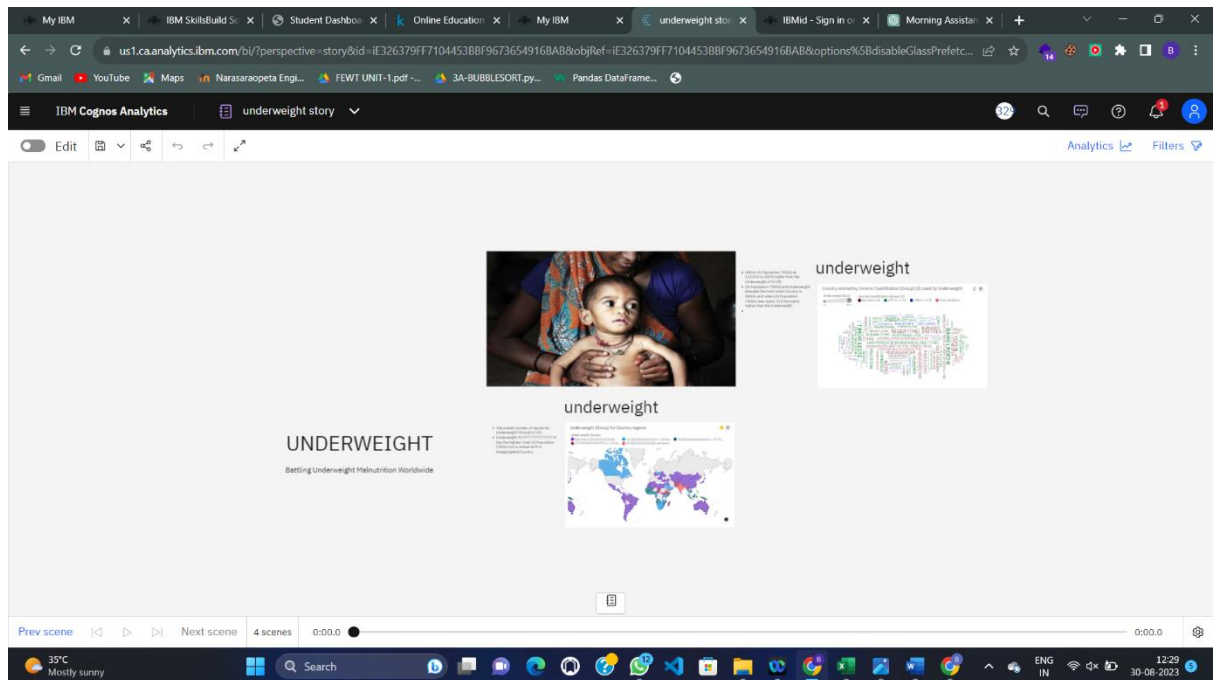
1. **Dashboards:** Dashboards are interactive visual displays that consolidate information from different sources into a single, accessible interface. In IBM Cognos, you likely designed dashboards that provide a real-time snapshot of key metrics and trends related to malnutrition across countries.
 - **Visual Elements:** You incorporated various visualization elements such as charts, graphs, tables, and maps to showcase different dimensions of malnutrition data. These visual elements make it easy for users to grasp complex information at a glance.
 - **Interactivity:** Interactive features like filters, slicers, and drill-down options enable users to customize their view of the data, focusing on specific countries, time periods, or metrics of interest.



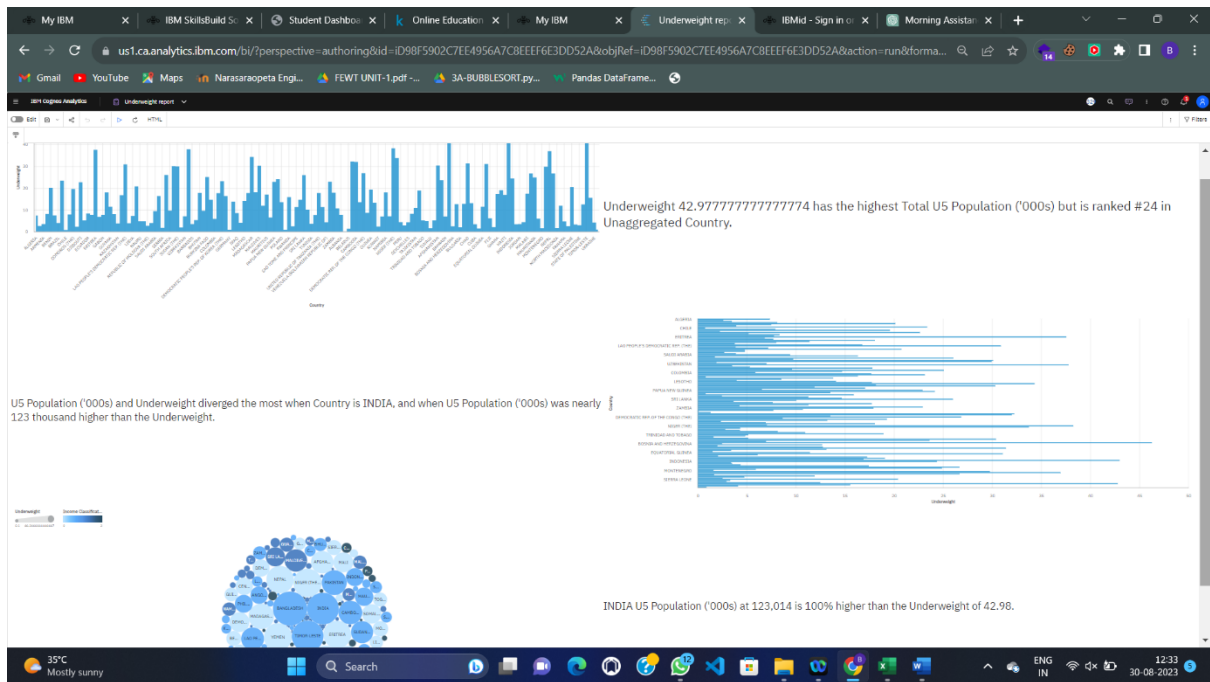


2. **Stories:** A story is a dynamic sequence of visualizations and narratives that guide users through a particular analysis or set of insights. Within IBM Cognos, you created stories that provide a structured narrative around malnutrition trends and their underlying factors.

- **Narrative Flow:** Your story likely starts with an introduction to the malnutrition issue, followed by a series of visualizations that gradually reveal insights. Each visualization contributes to the overall story arc, leading to key takeaways and conclusions.
- **Annotations:** Annotations and annotations, which you added to specific visualizations, help highlight noteworthy points, trends, or anomalies within the data.



3. **Reports:** Reports are formal documents that present data and analysis findings in a structured format. In IBM Cognos, you generated reports that offer in-depth insights into the malnutrition datasets.
 - **Structured Presentation:** Your reports likely follow a structured format, including an executive summary, methodology, findings, and conclusions. Visualizations are integrated within the report to support the analysis presented in the text.
 - **Data Context:** Reports provide a broader context for understanding the data and its implications. You might have included background information, research objectives, and explanations of the methodologies employed.



ALL MY DASHBOARDS: