Bharatiya Vidya Bhavan's

SARDAR PATEL INSTITUTE OF TECHNOLOGY

Advanced Data Visualization

Experiment no. 6

Submitted To

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Submitted By

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Batch: BE Comps (Batch B)

1. Aim:

Design Interactive Dashboards and Storytelling using using Power BI or Tableau on the dataset - Animal / Wildlife / Marine

- Basic - Bar chart, Pie chart, Histogram, Time line chart, Scatter plot, Bubble plot
- Advanced - Word chart, Box and whisker plot, Violin plot, Regression plot (linear and nonlinear), 3D chart, Jitter
- Use of DAX queries in Power BI (https://learn.microsoft.com/en-us/power-bi/transform-model/desktop-quickstart-learn-dax-basics)
- Write observations from each chart

2. Procedure Description:

Step-1: Dataset:

You can view the dataset from this link.

Step-2: Description:

This dataset contains records on every international import or export conducted with species from the CITES lists in 2016. It contains columns identifying the species, the import and export countries, and the amount and characteristics of the goods being traded (which range from live animals to skins and cadavers). This dataset was originally aggregated by CITES and made available online through this downloader tool.

Step-3: MetaData:

- **Year**: The year the export or import occurred, either 2016 or 2017.
- **App.**: The appendix the species belongs to, indicating protection level (I, II, III).
- **Taxon**: The taxonomic taxon or species name.
- **Class**: The species' taxonomic class.
- **Order**: The species' taxonomic order.
- **Family**: The species' taxonomic family.
- **Genus**: The genus or scientific name of the species.
- **Importer**: The ISO country code of the importing country.
- **Exporter**: The ISO country code of the exporting country.
- **Origin**: The ISO country code of the species' origin.

Step-4: Data Modeling - Star Schema:

Fact Table:

- **Fact tables** store quantitative data for analysis and contain the primary measures of interest (e.g., numerical metrics like quantities, sales, or costs).
- In this case, the **fact table** named `fact` includes fields such as:
    - `App.` (possibly short for "Application" or a related measure).
    - `Class`, `Exporter`, `Family`, `Genus`, `Importer`, `Order` (likely foreign keys connecting to the dimension tables).
    - `Exporter reported quantity` and `Importer reported quantity` (aggregated metrics of interest).
- The fact table centralizes these key measures and connects to related dimensions to enable detailed analysis.

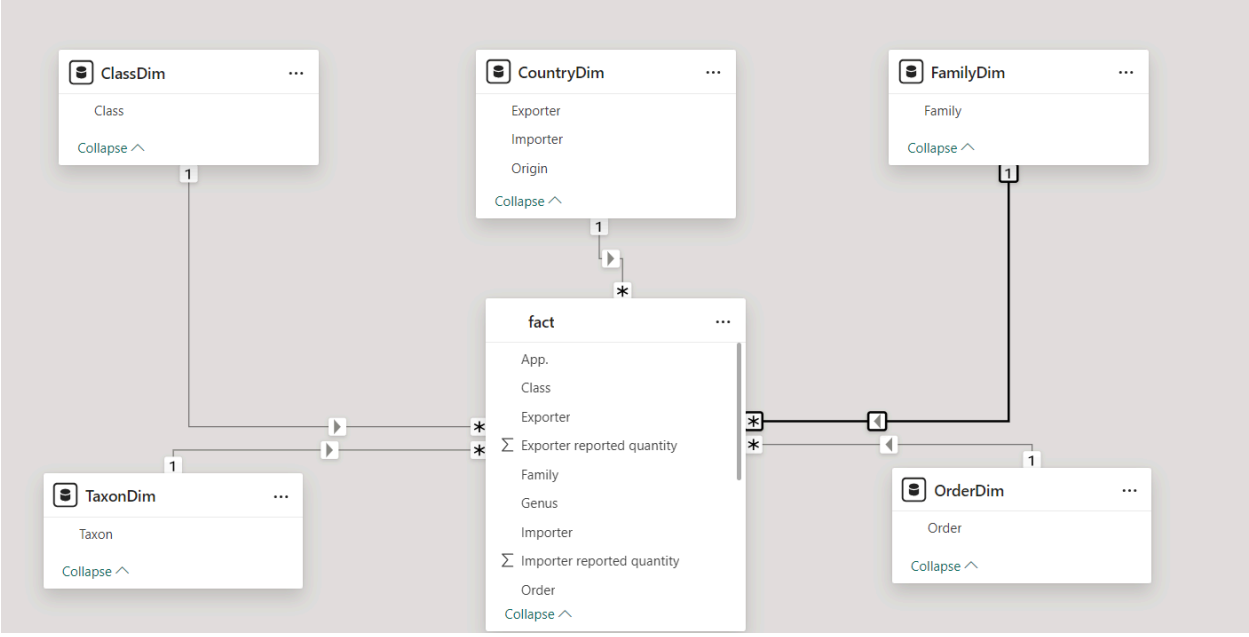
Dimension Tables:

- **Dimension tables** provide descriptive information (attributes) related to the measures in the fact table. They allow you to slice and dice the fact data along different perspectives.
- In this model, the dimension tables include:
    - **`ClassDim`**: Stores data about `Class` (a classification level in biological taxonomy).
    - **`CountryDim`**: Contains information about the `Exporter`, `Importer`, and `Origin` countries.
    - **`FamilyDim`**: Represents the `Family` taxonomy category.
    - **`TaxonDim`**: Contains information on the `Taxon` category.
    - **`OrderDim`**: Stores data about the `Order` classification level.

Relationships:

- The fact table connects to each of the dimension tables via foreign key relationships, denoted by the arrows between the tables. The relationships allow for the dimensional analysis of the facts based on the descriptive attributes in the dimension tables.

In summary, the **fact table** holds key metrics related to exporting and importing, while the **dimension tables** describe the biological classification, countries, and other related attributes for analysis.



Step-5: Data Visualization Analysis:

1. Bar Chart: Sum of Exporter Reported Quantity by Exporter and Unit

- **Description**: This horizontal bar chart shows the sum of reported quantities of exported wildlife species by various countries. It is broken down by the unit of measurement (e.g., cm, cm2, kg, m2, ton).
- **Observations**:
    - **China (CN)** and **Turkey (TR)** are the largest exporters based on reported quantities.
    - The units vary for the exported quantities, but most exporters have reported in units like cm, m2, kg, and ton.
    - Smaller exporters such as France (FR) and Oman (OM) are represented with lower quantities.

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2. Pie Chart: Count of Taxon by Appendix and Term

- **Description**: This pie chart represents the distribution of wildlife species based on their CITES appendix (Appendix I, II, III, and N). The appendices indicate the level of protection needed by the species.
- **Observations**:
    - **Appendix II** species constitute the largest share of the pie (45.66%), indicating that these species are the most traded.
    - **Appendix I** species, which are the most protected, make up a smaller portion (3.5%).
    - **Appendix III** and **Appendix N** species are even smaller, implying fewer transactions involving them.

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3. Line Chart: Sum of Importer Reported Quantity by Exporter Reported Quantity

- **Description**: This line chart compares the quantities reported by importers versus those reported by exporters.
- **Observations**:
    - There is a significant rise and fall in quantities as we move from lower to higher reported quantities.
    - A peak occurs around the 20M mark, showing a maximum value where import and export quantities are closely aligned.

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4. Bar Chart: Sum of Importer Reported Quantity by Class

- **Description**: This bar chart displays the total quantities of wildlife species imported, categorized by their taxonomic class (e.g., Actinopteri, Reptilia).
- **Observations**:
    - **Actinopteri** (ray-finned fishes) are the most imported class, with over 100M reported quantities.
    - **Reptilia** comes second, while other classes like Insecta, Amphibia, and Mammalia have much smaller reported quantities.
    - There's a stark contrast in reported quantities across different taxonomic classes, indicating preferences for certain wildlife classes.

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5. Scatter Plot: Sum of Importer Reported Quantity and Sum of Exporter Reported Quantity by Exporter and Origin

- **Description**: This scatter plot visualizes the relationship between exporter and importer reported quantities, with different origins marked using colored dots.
- **Observations**:
    - Countries like **AE** (United Arab Emirates) and **AR** (Argentina) have higher exporter reported quantities compared to importer reported quantities.
    - **AT** (Austria) and **AQ** (Antarctica) are smaller trading origins but still play a role in the wildlife trade.
    - Most dots are clustered in the lower quantity range, indicating many small transactions from various origins.

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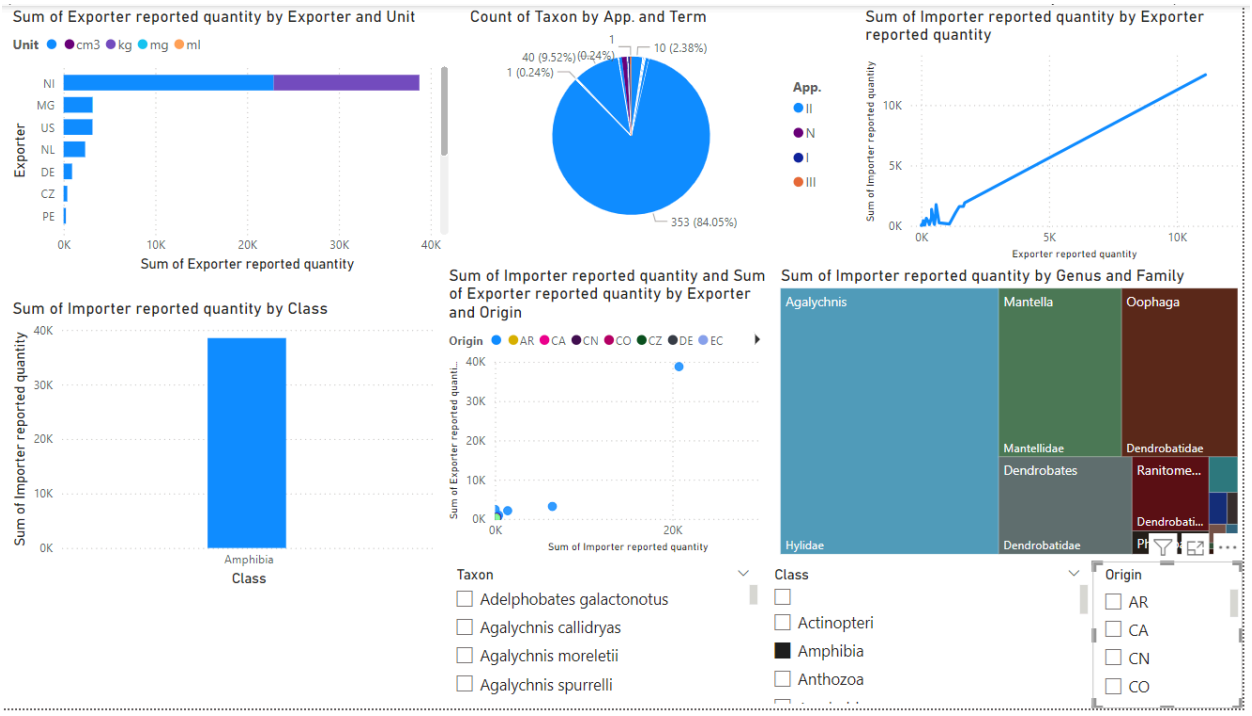
6. Tree Map: Sum of Importer Reported Quantity by Genus and Family

- **Description**: This tree map highlights the reported quantities of wildlife species by genus and family. Larger blocks represent higher quantities.
- **Observations**:
    - **Galanthus** (a genus of flowering plants) is the most prominent block, indicating it is highly traded.
    - Other significant families include **Cactaceae**, **Anguilla**, **Amaryllidaceae**, and **Alligator**.
    - The map clearly shows that plant species such as **Cactaceae** and **Amaryllidaceae** dominate the trade, along with some animal species (e.g., **Alligatoridae**).


Sum of Exporter reported quantity by Exporter and Unit
Unit cm3 kg mg ml
NI
MG
US
NL
DE
CZ
PE
Exporter
0K 10K 20K 30K 40K
Sum of Exporter reported quantity
Count of Taxon by App. and Term
1
10 (2.38%)
40 (9.52%)
1 (0.24%)
353 (84.05%)
App.
II
N
I
III
Sum of Importer reported quantity by Exporter reported quantity
Sum of Importer reported quantity
10K
5K
0K
0K 5K 10K
Exporter reported quantity
Sum of Importer reported quantity by Class
40K
30K
20K
10K
0K
Amphibia
Class
Sum of Importer reported quantity and Sum of Exporter reported quantity by Exporter and Origin
Origin AR CA CN CO CZ DE EC
Sum of Exporter reported quantit...
40K
30K
20K
10K
0K
0K 20K
Sum of Importer reported quantity
Sum of Importer reported quantity by Genus and Family
Agalychnis
Hylidae
Mantella
Mantellidae
Oophaga
Dendrobatidae
Dendrobates
Dendrobatidae
Ranitome...
Dendrobati...
Taxon
Adelphobates galactonotus
Agalychnis callidryas
Agalychnis moreletii
Agalychnis spurrelli
Class
Actinopteri
Amphibia
Anthozoa
Origin
AR
CA
CN
CO