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# Food and Feed Analysis for The Years 1961-2013 In Different Countries.

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**ABSTRACT:** In this study we have analyzed the different countries food and feed productivity for humans and animals to meet their demand in the upcoming years. The data was collected from the Food and Agriculture organization (FAO) official website form the year 1961 to 2013. The factors considered in the analysis are area, food produced, latitude, longitude, units of food produced in tons. Classification of countries based on their productivity has been done using clustering and for better interpretation Exploratory Data Analysis has been used. The final result of the study is to classify the countries that has the highest productivity of both the food items among others. In this study we have focused on utilization of each food item available.

**KEYWORDS:** Food, feed, FAO, clustering.

## I. INTRODUCTION:

Our world population is expected to grow from 7.3 billion todays to 9.7 billion in the year 2050. Finding solutions for feeding the growing world population has become a hot topic for food and agriculture organizations, entrepreneurs and philanthropists. These solutions range from changing the way we grow our food to changing the way we eat. To make things harder, the world's climate is changing and it is both affecting and affected by the way we grow our food – agriculture. This dataset provides an insight on our worldwide food production - focusing on a comparison between food produced for human consumption and feed produced for animals. The Food and Agriculture Organization of the United Nations provides free access to food and agriculture data for over 245 countries and territories, from the year 1961 to the most recent update (depends on the dataset). One dataset from the FAO's database is the Food Balance Sheets. It presents a comprehensive picture of the pattern of a country's food supply during a specified reference period, the last time an update was loaded to the FAO database was in 2013. The food balance sheet shows for each food item the sources of supply and its utilization. This chunk of the dataset is focused on two utilizations of each food item available.

## II. LITERATURE REVIEW:

According to Miriam Horn many of the men and women doing today's most consequential environmental work—restoring America's grasslands, wildlife, soil, rivers, wetlands, and oceans—would not call themselves environmentalists; they would be too uneasy with the connotations of that word. What drives them is their deep love of the land: the iconic terrain where explorers and cowboys, pioneers and riverboat captains forged the American identity. They feel a moral responsibility to preserve this heritage and natural wealth, to ensure that their families and communities will continue to thrive. According to Robert D. Saik Food has become the new religion. While denominations such as paleo, vegan, and organic debate which is "the way," we're ignoring a truth that affects us all: to support a population nearing 10 billion by 2050, agriculture must become infinitely sustainable. To feed the world, we have to grow 10,000 years' worth of food in the next 30 years, which means farmers worldwide must increase food production by 60 to 70 percent. This book is about the small percentage of those "farmers of consequence" being called upon to grow the vast majority of the world's staple food supply. While mighty in their ability, they need support from a general public that increasingly has no idea how they operate. According to Barbara "Our highest shopping goal was to get our food from so close to home, we'd know the person who grew it. Often that turned out to be ourselves as we learned to produce what we needed, starting with dirt, seeds, and enough knowledge to muddle through. Or starting with baby animals, and enough sense to refrain from naming them." According to Gongde Guo et.al[6], The k-Nearest-Neighbours (kNN) is a non-parametric classification method, which is simple but effective in many cases. For a data record t to be classified, its k nearest neighbours are retrieved, and this forms a neighbourhood of t. However, to apply kNN we need to choose an appropriate value for k, and the success of classification is very much dependent on this value. In a sense, the kNN method is biased by k.

## III. RESEARCH METHODOLOGY:

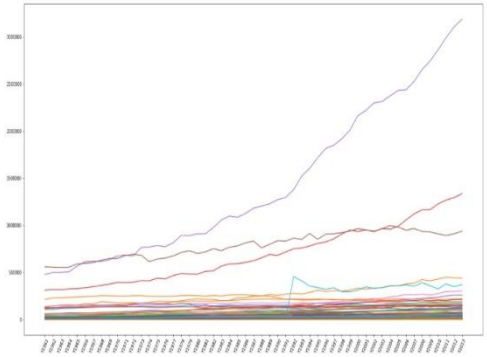
The data for the analysis was collected from the official Food and Agriculture Organisation website. Data pre-processing was done using various methods. We started with the basic descriptive statistics and the count of null values in each column. The null value for each of the column turns out to be zero. After the pre-processing we interpreted the data using different exploratory data analysis methods such as heat map, corelation analysis, and has identified the different patterns in the data using clustering , and finally we identified the patterns in food productivity of different countries.

**DATA ANALYSIS AND INTERPRETATIONS:**

| | Area Abbreviation | Area Code | Area | Item Code | Item | Element Code | Element | Unit | latitude | longitude | ... | Y2004 | Y2005 | Y2006 | Y2007 | Y2008 | Y2009 | Y2010 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0 | AFG | 2 | Afghanistan | 2511 | Wheat and products | 5142 | Food | 1000 tonnes | 33.94 | 67.71 | ... | 3249.0 | 3486.0 | 3704.0 | 4164.0 | 4252.0 | 4538.0 | 4605.0 |
| 1 | AFG | 2 | Afghanistan | 2805 | Rice (Milled Equivalent) | 5142 | Food | 1000 tonnes | 33.94 | 67.71 | ... | 419.0 | 445.0 | 546.0 | 455.0 | 490.0 | 415.0 | 442.0 |
| 2 | AFG | 2 | Afghanistan | 2513 | Barley and products | 5521 | Feed | 1000 tonnes | 33.94 | 67.71 | ... | 58.0 | 236.0 | 262.0 | 263.0 | 230.0 | 379.0 | 315.0 |
| 3 | AFG | 2 | Afghanistan | 2513 | Barley and products | 5142 | Food | 1000 tonnes | 33.94 | 67.71 | ... | 185.0 | 43.0 | 44.0 | 48.0 | 62.0 | 55.0 | 60.0 |
| 4 | AFG | 2 | Afghanistan | 2514 | Maize and products | 5521 | Feed | 1000 tonnes | 33.94 | 67.71 | ... | 120.0 | 208.0 | 233.0 | 249.0 | 247.0 | 195.0 | 178.0 |

5 rows × 63 columns

Fig 1: The above picture is the dataset of FAO's food balance from the year 1961-2013.



Clearly, China, India and US stand out here. So, these are the countries with most food and feed production.

Fig2: The above plot represents the total number of food and feed products produced in a year. Here the x-axis denotes the years and y-axis denotes the annual produce of different countries base on the quantity. From the plot it is clearly known that China, India and UK are the top three in the production of food and feed items.

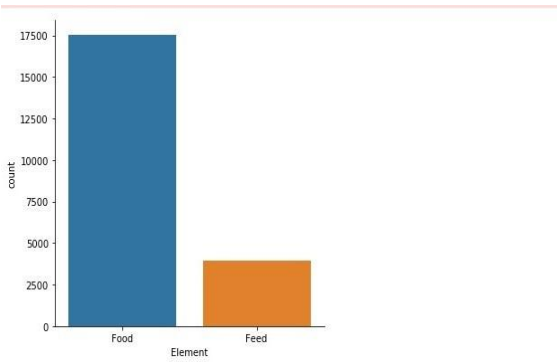



Fig3: The above graph represents the difference in the food and feed production for the whole dataset. Here x-axis represents the elements and y-axis represents the counts (in tonnes). From the above graph it is clear that feed production is only 16% of the total food production.

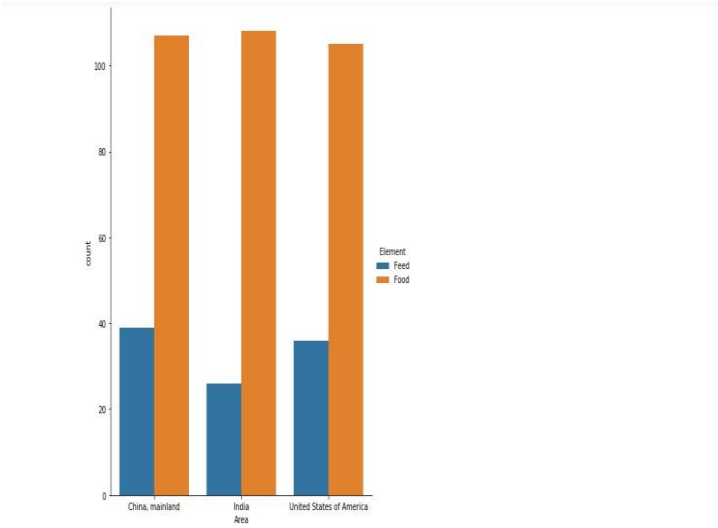



Fig4: The above graph represents the food and feed production between the top produced countries China, India and USA (as we found that earlier). Here the x-axis denotes countries and the y-axis denotes counts (in tonnes).

Out[9]:

| | Y1961 | Y1962 | Y1963 | Y1964 | Y1965 | Y1966 | Y1967 | Y1968 | Y1969 | Y1970 | ... | Y2004 | Y2005 | Y2006 | Y2007 | Y2008 | Y2009 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Afghanistan | 9481.0 | 9414.0 | 9194.0 | 10170.0 | 10473.0 | 10169.0 | 11289.0 | 11508.0 | 11815.0 | 10454.0 | ... | 16542.0 | 17658.0 | 18317.0 | 19248.0 | 19381.0 | 20661.0 | 2 |
| Albania | 1766.0 | 1749.0 | 1767.0 | 1889.0 | 1884.0 | 1995.0 | 2046.0 | 2169.0 | 2230.0 | 2395.0 | ... | 6637.0 | 6719.0 | 6911.0 | 6744.0 | 7168.0 | 7316.0 | |
| Algeria | 7488.0 | 7235.0 | 6861.0 | 7255.0 | 7509.0 | 7536.0 | 7986.0 | 8839.0 | 9003.0 | 9355.0 | ... | 48619.0 | 49562.0 | 51067.0 | 49933.0 | 50916.0 | 57505.0 | 6 |
| Angola | 4834.0 | 4775.0 | 5240.0 | 5286.0 | 5527.0 | 5677.0 | 5833.0 | 5685.0 | 6219.0 | 6460.0 | ... | 25541.0 | 26696.0 | 28247.0 | 29877.0 | 32053.0 | 36985.0 | 3 |
| Antigua and Barbuda | 92.0 | 94.0 | 105.0 | 95.0 | 84.0 | 73.0 | 64.0 | 59.0 | 68.0 | 77.0 | ... | 92.0 | 115.0 | 110.0 | 122.0 | 115.0 | 114.0 | |

5 rows × 53 columns

Fig5**:** It is the dataframe with a country as the index and their column names as the year (1961-2013)

| | Item_Name | Y1961 | Y1962 | Y1963 | Y1964 | Y1965 | Y1966 | Y1967 | Y1968 | Y1969 | ... | Y2006 | Y2007 | Y2008 | Y2009 | Y201 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0 | Wheat and products | 138829.0 | 144643.0 | 147325.0 | 156273.0 | 168822.0 | 169632.0 | 171468.0 | 179530.0 | 189658.0 | ... | 537279.0 | 539271.0 | 560239.0 | 557245.0 | 549826 |
| 1 | Rice (Milled Equivalent) | 122700.0 | 131042.0 | 138507.0 | 148394.0 | 150056.0 | 155563.0 | 158587.0 | 164614.0 | 167922.0 | ... | 372639.0 | 376698.0 | 388708.0 | 394221.0 | 398559 |
| 2 | Barley and products | 46180.0 | 48915.0 | 51642.0 | 54184.0 | 54945.0 | 55463.0 | 56424.0 | 60455.0 | 65501.0 | ... | 100981.0 | 93310.0 | 98209.0 | 99135.0 | 92563 |
| 3 | Maize and products | 168039.0 | 168305.0 | 172905.0 | 175468.0 | 190304.0 | 200860.0 | 213050.0 | 215613.0 | 221953.0 | ... | 543280.0 | 573892.0 | 592231.0 | 557940.0 | 584337 |
| 4 | Millet and products | 19075.0 | 19019.0 | 19740.0 | 20353.0 | 18377.0 | 20860.0 | 22997.0 | 21785.0 | 23966.0 | ... | 25997.0 | 26750.0 | 26373.0 | 24575.0 | 27039 |

5 rows × 56 columns

Fig6: It is the dataframe with items and their total production each year from 1961 to 2013

```
56    Cereals - Excluding Beer
65     Fruits - Excluding Wine
3           Maize and products
53     Milk - Excluding Butter
6        Potatoes and products
1     Rice (Milled Equivalent)
57               Starchy Roots
64                  Vegetables
27           Vegetables, Other
0           Wheat and products
Name: Item_Name, dtype: object
```

Fig7: Here we found the most produced food items during the given years from the data obtained from the dataframe (Fig6). From the above data we had calculated it is obvious that cereals, fruits and maize are the most produced food items.

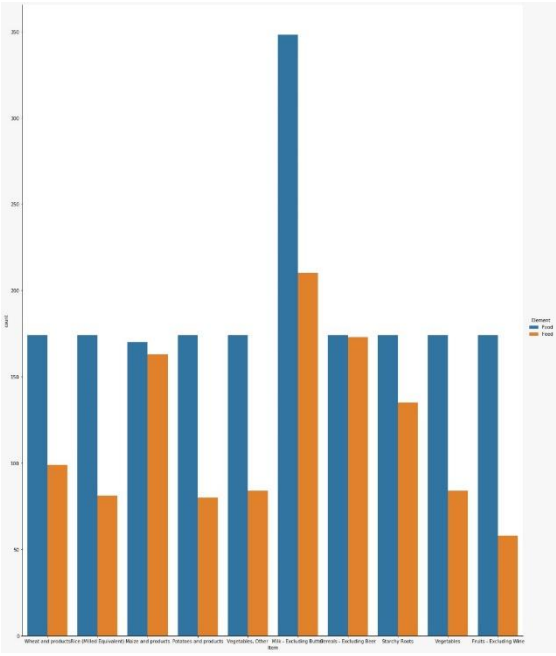


Fig8: the above graphs gives the graphical representation for food and feed plot for most produced items cereals ,fruits and maize(as we found earlier). Here the x-axis denotes items and the y-axis denotes the counts (in tonnes).

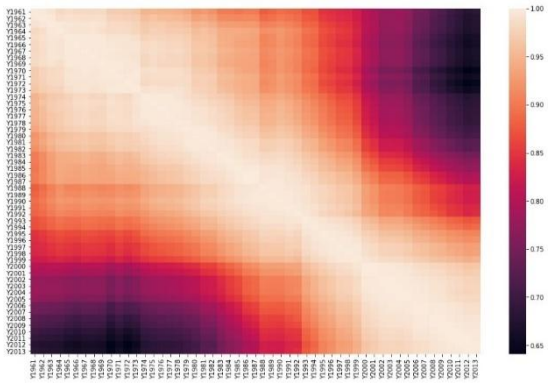


Fig9: It is the heatmap of correlation of produce in difference years.

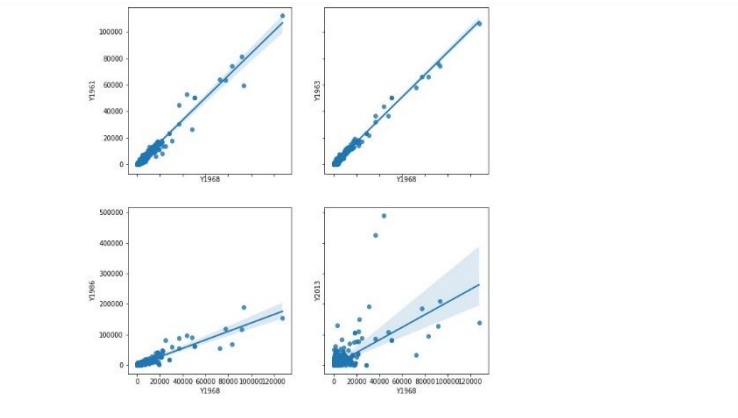



Fig10: Here we have plotted graph for the year 1968 as base with 1961, 1963,1986 and 2013 because we found from the heatmap that a given year's production is more similar to its immediate previous and immediate following years.

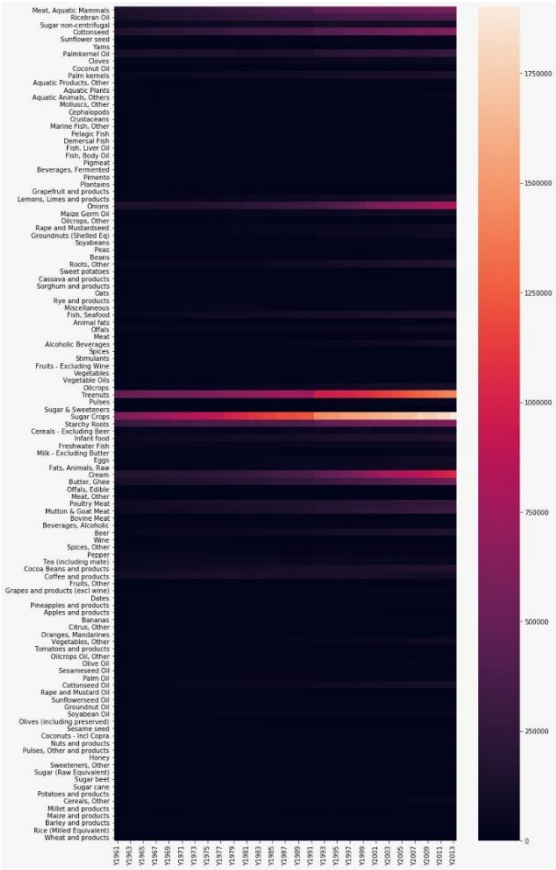


Fig11: It is the heatmap of production of food items over items. It will detect the items whose production has drastically increased over the years.

From the heatmap we found that there is considerable growth in production of Palmkernel oil, Meat/Aquatic animals, ricebran oil, cottonseed, seafood, offals, roots, poultry meat, mutton, bear, cocoa, coffee and soyabean oil. There has been exceptional growth in production of onions, cream, sugar crops, treenuts, butter/ghee and to some extent starchy roots.

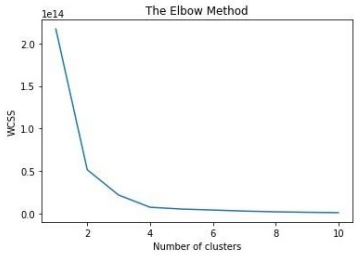



Fig12: It is the graph drawn for knowing the number the clusters to be there for clustering using the **ELBOW**

**METHOD**. Here x-axis denotes the number of clusters and y-axis denotes wcss which is found through kmeans.inertia_ that have been calculate from the dataframe Fig5. As the elbow corner coincides with x=2, we will have to form **2 clusters.**

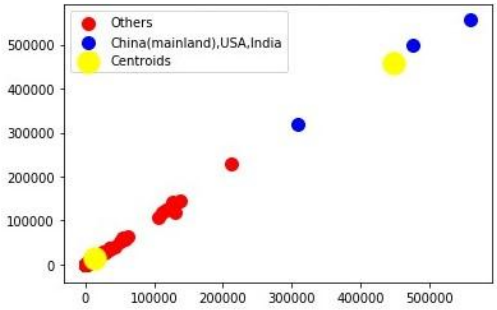



Fig13: It is the clusters of countries by productivity. Therefore, the blue cluster represents China (Mainland), USA and India while the red cluster represents all the other countries.

## IV. CONCLUSION:

The blue cluster represents China(Mainland), USA and India while the red cluster represents all the other countries. This result was highly probable. Just take a look at the plot of cell 3 above. See how China, USA and India stand out. That has been observed here in clustering too…Which means that China, India and USA are the main producers of food and feed products while compared to rest of the countries in the world.

## REFERENCE:

1. **Animal, Vegetable, Miracle: A Year of Food Life**
   By Barbara Kingslover
2. **The Worst Hard Time: The Untold Story of Those Who Survived the Great American Dust Bowl**
   By Timothy Egan
3. **Seeds of Science: Why We Got It So Wrong On GMOs**
   By Mark Lyons
4. **A Soil Owner's Manual: How to Restore and Maintain Soil Health**
   By Jon Stika
5. K-means clustering from Wikipedia
   https://en.wikipedia.org/wiki/K-means_clustering#Standard_algorithm
6. Gongde Guo, Hui Wang, David Bell, Yaxin Bi, Kieran Greer, 2004, KNN Model - Based Approach in Classification
7. Growing food and protecting nature don't have to conflict – here's how they can work together
   Thomas Hertel, Purdue University