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An Exploratory Study of Beneficiaries of the Indira Gandhi Old Age Pension at National Level Program

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ABSTRACT: An exploratory study on the recipients of India's Gandhi Old Age Pension at National Level Program (IGNOAP) is presented in this research report. The study's objectives is to ascertain and evaluate the recipients' socioeconomic, regional, and demographic traits. A range of exploratory Methods for data mining are employed with a sizable dataset to find patterns and trends among the pension program participants. The results offer insightful details regarding the composition and distribution of beneficiaries, laying the foundation for policymakers to improve the functionality of the application efficiency and focus. This study emphasizes how crucial data-driven strategies are to enhancing social welfare programs and guaranteeing fair resource distribution.

KEYWORDS: Exploratory data analysis, demographic patterns, socio-economic characteristics, geographic distribution, data visualization, social welfare programs, policy insights, elderly welfare, and The Indira Gandhi Old Age Pension at National Level Program.

I. INTRODUCTION

One such program is the Program for National Social Assistance (NSAP).welfare program that is managed through the Division of Rural Development. This initiative is being done in both urban and rural settings. The Constitution of India upholds the State's Directive Principles Policy, and the NSAP is an essential step in achieving this goals.

This study investigates the application of machine learning approaches to optimize beneficiary identification and targeting under IGNOAPS and boost the program's effectiveness.

Although vulnerabilities exist at every stage of life, they become more noticeable as one ages (Gupta, 2013). An aging person grows increasingly reliant due to age-related health issues and their incapacity to earn a living. The issue is particularly severe for the improve published since their ongoing lack of resources keeps them from planning for their retirement. The underprivileged become increasingly dependent on the government because of the shift away from traditional joint families and the increase in migration. To ensure that offer a safety net for the most susceptible individuals society, government-sponsored pension schemes like the "Indira Gandhi Old Age National Pension Scheme (IGNOAPS)" are crucial.

It's possible that some qualified individuals do not truly receive the benefit, even in spite of the stated qualifying requirements. The 2005 IHDS statistics clearly show that households earning more than the mean poverty level(APL)accounted for 45 percentage of the recipients. This blatantly demonstrates the existence of a "type -2 error" in the plan, meaning that several ineligible people are receiving benefits. And the possible the reason behind the "type-2 error" is that, additionally to the government-mandated eligibility rule, there may be other relevant variables. As an illustration, A household's access to elected officials or other types of networks perhaps a major factor in assessing a person's eligibility for benefits. In emerging nations, it is common to witness political capture of the public interest. Furthermore, a brief examine the 2011 data from IHDS indicates that around 32% of households with APL cards include recipients of IGNOAPS benefits.

II. DATA

Data Source

The Data.Gov websites, which offer an extensive collection of public data, including Records of social welfare programs are the source of the information utilized in this research.

An Investigative Analysis of the Indira Gandhi Old Age Pension at National Level Program Recipients: To ensure that evaluate the reach, efficacy, and influence of the National Pension for Old age of Indira Gandhi Program on improving the standard of living for senior adults in India, this study will examine the demographic and socioeconomic features of program participants.

Data Supply

By offering a centralized platform where government departments frequently upload and update data, supplying it for public use and research, Data.Gov websites guarantee the availability of current and comprehensive datasets. An Investigative Analysis of the Indira Gandhi Old Age Pension at National Level Program Recipients To evaluate the Indira Gandhi Old Age Pension at National Level Program's coverage, efficacy, and influence on the well-being of India's senior citizenry, this study looks into the traits and experiences of its recipients.

Data Collection

Downloading pertinent datasets from different government agencies is the initial phase of gathering data from Data.Gov websites. This ensures that the data is current, correct, and complete for research needs.

An Investigative Analysis of the National Senior Citizens of Indira Gandhi Program Recipients The goal of this research is to evaluate the efficacy of the National Senior Citizens of Indira Gandhi Program in reducing poverty and raising the living standard for India's elderly by examining the demographic and socioeconomic features of its recipients.

Data Structure

Data is usually organized in tabular style for exploratory data analysis (EDA) on datasets from Data.Gov websites. Rows represent individual records, while columns reflect a several, such as age and gender, income level, and geographic region.

This study uses EDA to find patterns, trends, and perceptions of the distribution and effects of pension benefits among India's old population. It does this by doing a comprehensive evaluation of the National Old Age Pension of Indira Gandhi Program recipients.

III. METHODOLOGY

Data collection

In research methodology, data collection speaks of the methodical process of obtaining and quantifying information to be able to respond to research inquiries, evaluate theories, and assess results. The gathered information can be examined, and conclusions on the study's topic matter can be produced by utilizing the results to confirm or deny theories.

DataSet Details: Data set Contains 9426 rows × 16 columns . It Includes Column name as fin_year, state_name, district_name, scheme_code, md5_uid_str,last_updated These are the object Dtype. let us see int64 Dtype are mnth lgd_state_code, lgd_district_code, total_beneficiaries ,total_sc ,total_st, total_gen, total_obc, total_aadhar, total_mobilen0.

Data preprocessing: The changes we make to our data before supplying that to the algorithm are recognized as preprocessing. One method for transforming the raw data into a clean data set is data preparation. Put differently, anytime data is obtained in raw format from several sources, it's not suitable for analysis.

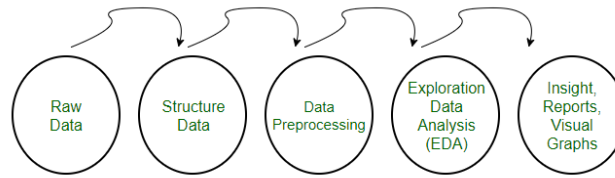


Fig. 1 Data preprocessing

Preprocessing Data Is Necessary

The data format must be correct To enhance the performance of the applied model in machine learning projects. For example, the Random Forest technique does not tolerate null values; consequently, To be able to run the algorithm, null values must be handled from the original raw data set. Other particular Information is required for machine learning models. in a specific format.

An additional consideration is that what the data set ought to be structured so that multiple Deep Learning and machine learning algorithms be run on it, with the highest performing method being selected.

Procedures for Preprocessing Data

Step 1: Import the Libraries

Understanding our data and experimenting with it using libraries is the first step in utilizing Python for machine learning. situation where dataset's IGNOAPS 23-24.Bring Throughout every one of the libraries required for the loading of data, statistical analysis, data transformations, data visualization, merges and joins, and other required analyses. Matplotlib Numerical analysis using Numpy and Pandas computations and data manipulation.

Step 2 : Reading the Dataset

Examining the Dataset The Pandas library offers several alternatives for importing data from files. such as JSON, CSV, XLSX, SQL, Pickle, HTML, TXT, and pictures into the pandas DataFrame. The majority of the data are accessible. as CSV files in tabular format. It's accessible and stylish. The read.csv() method may become accustomed to transform data into a pandas DataFrame. The data used to forecast the price of used cars is one instance example in this article. We are attempting to examine the pricing of used cars in this dataset and how EDA concentrates on determining the elements impacting the automobile price. The Data is stored in the DataFrame data.

Step 3: Analysing data

Examining the Information By looking at every variable We hear our data within the information before drawing any conclusions. Gaining broad awareness of the information, including its values, kinds, quantity of columns and rows, additionally any missing data in the dataset, is the primary objective of data comprehension.

shape: The form will show The amount of features(16 columns) and observations (9426 rows) within the dataset.

head(): The dataset's top five observations will be shown using head().

tail(): The dataset's final five observations will be shown via tail().

info() : Facilitates comprehension The characteristics of data and details about it, like the amount of records in each column, whether or not the data is null, The characteristics of data, and how much memory the dataset uses.

data.info(): According to data.info(), There are a few values lacking for the following variables are fin_year, mnth, lgd_state_code, state_name, lgd_district_code, district_name, scheme_code, total_beneficiaries, total_sc, totala_st, total_gen, total_obc, total_adhar, and total_mobilenno. Numerical variables having the I.datatypes object(6) and int(10) are examples of lgd_state_code. The category variables Fin_year, State_name, District_name, and Scheme_code are instances of object data type variables.

```
data.info()

<class 'pandas.core.frame.DataFrame'>
RangeIndex: 9426 entries, 0 to 9425
Data columns (total 16 columns):
#   Column                Non-Null Count  Dtype
---  -
0   fin_year              9426 non-null   object
1   mnth                 9426 non-null   int64
2   lgd_state_code       9426 non-null   int64
3   state_name           9426 non-null   object
4   lgd_district_code    9426 non-null   int64
5   district_name        9426 non-null   object
6   scheme_code          9426 non-null   object
7   total_beneficiaries  9426 non-null   int64
8   total_sc              9426 non-null   int64
9   total_st              9426 non-null   int64
10  total_gen             9426 non-null   int64
11  total_abc             9426 non-null   int64
12  total_aadhar          9426 non-null   int64
13  total_mobileno        9426 non-null   int64
14  md5_uid_str           9426 non-null   object
15  last_updated          9426 non-null   object
dtypes: int64(10), object(6)
memory usage: 1.2+ MB
```

unique(): Verify Unique Duplication() We are capable of determine which columns in the information are continuous and which are categorical based on the data description and multiple unique values within each column. Upon more examination, duplicate information can be managed or eliminated.

Missing Values

isnull(): To compute absent values and locate null values inside the data, the isnull() function is frequently utilized in all pre-processing phases.

data.isnull().any(): examines each DataFrame column for any absent values and returns a boolean series with True denoting that exists at least one missing value and False denoting that there isn't.

IV. DATA EXPLORATION AND VISUALIZATION

EDA (Exploratory Data Analysis)

EDA Investigative Information Analysis Investigative information analysis is the vital process of doing preliminary research on data using graphical representations and summary statistics to find trends and validate hypotheses. EDA may become accustomed to investigate the provided data for trends, patterns, and outliers. EDA facilitates the discovery of important patterns in data. In-depth data set insights are supplied by EDA to address our business challenges. EDA provides a hint to fill in the dataset's missing values.

TYPES OF Investigative Data Analysis

Univariate Analysis: To ensure that comprehend the internal structure of a single variable, univariate analysis is used. Its main goals are to characterize the information and identify patterns within a single characteristic. This type of assessment focuses on character variable analysis within the records set. One single unmarried variable at a time summarized and visualized in order to comprehend its distribution, pertinent tendency, unfurl, and various important records. Typical methods include of:

Histograms: An instrument for seeing a variable's distribution.

Box plots: Good for analysis the distribution and skewness of the information as well as for identifying outliers.

Bar charts: Used to show how frequently each category occurs in categorical data.

Summary statistics: The central tendency and data dispersion are described by computations such as mean, median, mode, variance, as well as the standard deviation.

Bivariate Analysis: Analysis the connection between variables is part of bivariate evaluation. It makes It is feasible to identify dependencies, correlations, and relationships between sets of variables. An essential type of exploratory data analysis that looks at the relationship between two different variables is bivariate analysis. Several essential methods for bivariate analysis include:

Scatter Plot: An illustration The relationship between a pair of continuous variables shown with a scatter plot.

Correlation Coefficient: This statistical measure quantifies the degree of the relation for linear relationships between two variables relationships, it is often Pearson's correlation coefficient.

Cross-tabulation: Also referred to as contingency tables, this method is accustomed to examine how two category variables are related to one another. It facilitates understanding of the link between the two variables by displaying the frequency distribution of categories for one variable in rows with the additional in columns.

Line Graphs: When comparing two variables over time, line graphs can be utilized in the context of time series data.

Covariance: A measurement of the amount that two random variables change together is called covariance.

Multivariate Analysis: The associations between two or more variables in the dataset are examined using multivariate analysis.

Pair plots: To get a complete picture of possible interactions, visualize relationships between multiple variables at once.

PCA: Examination of main components is accustomed to minimize the dimensionality of big datasets while maintaining as much variance as feasible.

V. TOOLS AND TECHNOLOGY

The Python programming language additionally data analysis libraries Pandas, NumPy, Matplotlib, or Seaborn are frequently employed by researchers to execute an exploratory study titled "An Exploratory Study of Beneficiaries of the Indira Gandhi Old Age Pension at National Level for Old Age Program" using Jupyter Lab. Jupyter Lab is fantastic instrument for completing preliminary data analysis and effectively presenting findings since it offers an interactive environment where researchers can create and run Python code, incorporate explanatory language, and display data.

A. Python and Jupyter Lab

To conduct preliminary data analysis (EDA) for "An Exploratory Study of Beneficiaries of the National Old Age Pension of Indira Gandhi Program," Python and Jupyter Lab are used. Researchers utilize Jupyter Lab to run code and utilize Python libraries like NumPy and Pandas for data cleaning and evaluation, additionally Matplotlib and Seaborn for visual aid creation. The EDA process is improved by the smooth integration of code, visual output, and explanatory text made possible by Jupyter Lab's interactive environment.

Python Libraries

Pandas: Pandas is used for preprocessing and data modification, enabling effective handling of data and cleansing.

NumPy: NumPy supports numerical operations and array manipulation, which is essential for mathematical computations involved in machine learning.

Data Visualization

Matplotlib: Matplotlib is popularly used Python library for creating appealing and interactive visualizations to help interpret and communicate results effectively.

Seaborn: Seaborn is used To be able to improve the aesthetics of Matplotlib visualizations and simplifying complex data visualization tasks.

VI. RESULT AND DISCUSSION

A. Model Evaluation

Utilize various Exploratory data analysis, such as pie chart, Bar Graph, correlation matrix, and histogram we use Exploratory Analysis in this paper.

Result

The following figures describe the results with Analysis

1) Distribution of total beneficiaries across Selected States

The distribution of total beneficiaries among the chosen states is shown in this pie chart. With 56.3% of the total beneficiaries, Bihar accounts for the greatest share of recipients. Gujarat is in third place with 13.2%, followed by Maharashtra with 16.0%. Karnataka makes up 10.7% of the total, with considerably lesser amounts from Punjab, Arunachal Pradesh, and Jammu & Kashmir. With a noticeable concentration in Bihar, this graphic representation aids in determining which states have the greatest and lowest numbers of beneficiaries. This details shown in the figure.

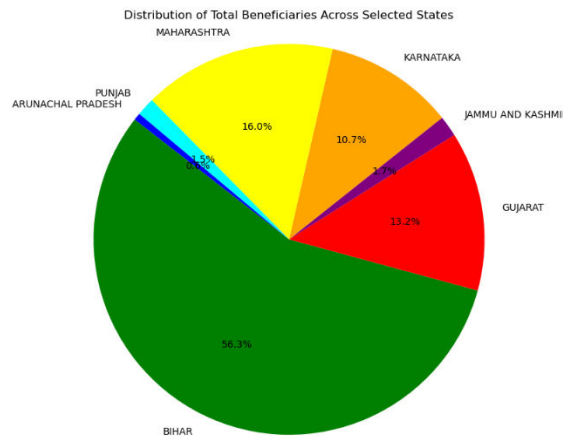


Fig. 2 Distribution of total beneficiaries across Selected States

2) Bar Graph as Total Beneficiaries by Category and year

For the years 2023 and 2024, the total beneficiaries for each among the four categories (SC, ST, GEN, and OBC) are displayed in the bar graph. In every category, the data shows a considerable decrease in the quantity of recipients between 2023 and 2024. More specifically, in both years, the largest number of beneficiaries fell into the General (GEN) group, which was followed by the OBC, SC, and ST categories. This pattern points to a possible shift in policy or demographics, additionally a significant decrease of beneficiaries for 2024. This details shown in the figure.

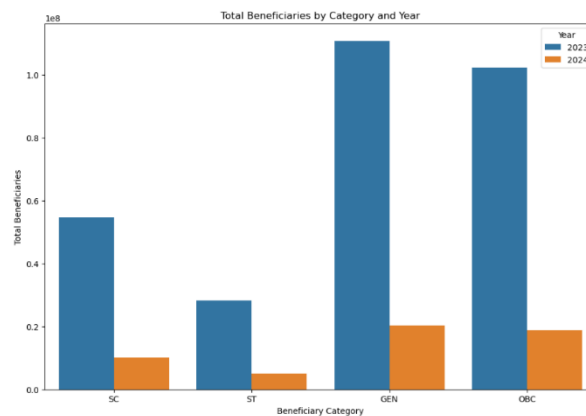


Fig. 3 Total Beneficiaries by Category and year

3) Total Beneficiaries by Month

The total number of recipients is shown in this bar graph by month. The data indicates that April and May had the largest number of recipients, with approximately 50 million in each of those two months. After that, the numbers sharply decline in June before stabilizing for the balance of the year, with an assortment of roughly 20 million to 30 million beneficiaries per month from June to December. This implies that beneficiary activity peaks in the spring and then stays steady during the second a portion of the year This details shown in the figure.

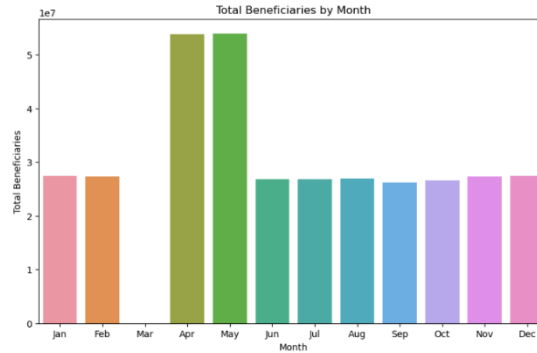


Fig. 4 Total Beneficiaries by Month

4) Total Beneficiaries by Aadhar and Mobile Number

The total number of recipients determined by Aadhaar and mobile number is contrasted in this bar graph. More than 250 million exit beneficiaries who use their Aadhaar for identification, that is a much bigger number than the 200 million beneficiaries who use their mobile number. This suggests that Aadhaar is employed more frequently than mobile numbers for beneficiary identification. This details shown in the figure.

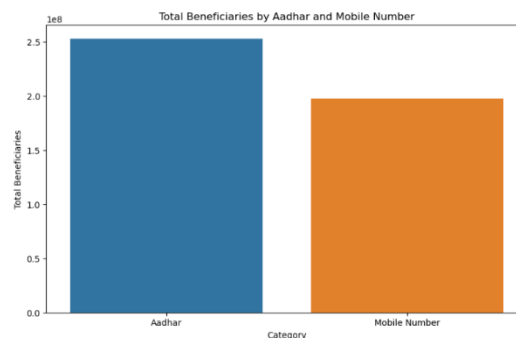


Fig. 5 Total Beneficiaries by Aadhar and Mobile Number

VII. ACKNOWLEDGEMENT: DECLARATION

One inside the National Social Assistance Programme's five sub-schemes is the "National Old Age Pension Scheme of Indira Gandhi"(IGNOAPS) (NSAP). Citizens 60 years old or beyond who are impoverished may apply under the IGNOAPS. The first month's payment of ₹ 200 79 years, and ₹ 500 after that.

The NSAP, or Launching of the National Social Assistance Program through the Indian government on August 15, 1995. It's a centrally sponsored program that is completely supported that aims in order to offer a minimal amount of monetary assistance for the destitute, who are defined as individuals who, without regular income or support financially from relatives or other sources, have little or no means of subsistence sources, which the U.S and UTs. The Division of Rural Development oversees the administration of the NSAP. This program is being done in both urban and rural locations.

The National Security Agenda (NSAP) is a major step in the direction of implementing the State's Directive Principles policy, which the Indian Constitution contains and require the State to implement various welfare programs within its means. These are meant To guarantee that citizens have a sufficient means of subsistence, enhance public health, elevate living standards, and give children free and compulsory education, among other things.

The current components of the NSAP are five sub-schemes:

- 1.The scheme for the Indira Gandhi National Pension for Old Age(IGNOAPS)
- 2.Indira Gandhi's National Widow Pension Scheme (IGNWPS)
- 3.The National Disability Pension System of Indira Gandhi (IGNDPS)

4. The NFBS, or the National Family Benefit Program
5. The Annapurna Plan

The NSAP's goals are:

1. Offers social assistance benefits to low-income households in the event that the primary earner passes away, becomes pregnant, or ages.
 2. Assure minimum national standards additionally to the advantages that the States may offer later on or present.
 3. Guarantee uninterrupted, consistent social protection for the recipients throughout the nation.
- Expansion to include all eligible BPL individuals - In 2007, the program was broadened to include all eligible individuals residing beneath the federal poverty line (BPL).

Benefits

The first month's payment of ₹ 200 And 79 years, and ₹ 500 after that.

Eligibility

The candidate must be an Indian citizen. The candidate must be below the federal poverty threshold. As The candidate ought to be at least sixty years old.

VIII. CONCLUSION

Utilizing Exploratory Data Analysis (EDA), the exploratory research of the National Old Age Pension of Indira Gandhi Program has shown the program's major influence on its recipients. The study's effective analysis and visualization of data, made possible by the application of Python and Jupyter Lab tools, demonstrated how well the pension program serves the elderly, especially those who are living in rural and economically disadvantaged areas. The program's financial assistance is necessary for lowering poverty and enhancing older people's access to healthcare and nutrition.

The results highlight how crucial data-driven methods are for assessing and improving social welfare initiatives. The program's effectiveness can be further increased by utilizing EDA and cutting-edge analytical techniques going forward, ensuring that it continues to fulfil the changing demands of its recipients.

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