

PROFESSIONAL TRAINING REPORT
AT
SATHYABAMA INSTITUTE OF SCIENCE
AND TECHNOLOGY
(DEEMED TO BE UNIVERSITY)

Submitted in partial fulfillment of the requirements for
the award of
Bachelor of Technology degree in Information Technology

by

Nikita Angeline David
(40120064)



DEPARTMENT OF INFORMATION TECHNOLOGY
SCHOOL OF COMPUTING
SATHYABAMA

INSTITUTE OF SCIENCE AND TECHNOLOGY

(DEEMED TO BE UNIVERSITY)
Accredited with Grade “A” by NAAC

JEPPIAAR NAGAR, RAJIV GANDHI
SALAI, CHENNAI - 600 119

APRIL – 2023



SATHYABAMA

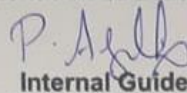
INSTITUTE OF SCIENCE AND TECHNOLOGY
(DEEMED TO BE UNIVERSITY)

Accredited "A" Grade by NAAC | 12B Status by UGC | Approved by AICTE
www.sathyabama.ac.in

DEPARTMENT OF INFORMATION TECHNOLOGY

BONAFIDE CERTIFICATE

This is to certify that this Project Report is the bonafide work of **Nikita Angeline David** who carried out the project entitled "**BIRTH RATE PREDICTION**" under my supervision from JANUARY 2023 to APRIL 2023


Internal Guide

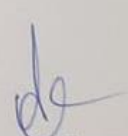
DR.P.AJITHA M.E., Ph.D


HEAD OF THE DEPARTMENT

Dr. R. Subhashini M.E., Ph.D

Submitted for Viva voce Examination held on 28/4/23


Internal Examiner


External Examiner

DECLARATION

I, **NIKITA ANGELINE DAVID** hereby declare that the Project Report entitled "**BIRTH RATE PREDICTION**" done by me under the guidance **Dr.P.Ajitha M.E.,Ph.D. (Internal)** at Sathyabama Institute of Science and Technology is submitted in partial fulfillment of the requirements for the award of Bachelor of Technology degree in Information Technology.

DATE: 28/4/23

PLACE: CHENNAI

SIGNATURE OF CANDIDATE:



ACKNOWLEDGEMENT

I am pleased to acknowledge our sincere thanks to Board of management of **SATHYABAMA** for their kind encouragement in doing this project and for completing it successfully. I am grateful to them.

I convey our thanks to **Dr. T. SASIKALA M.E., Ph.D.**, Dean, School of Computing and **Dr. R. SUBHASHINI M.E., Ph.D.**, Head of Department of Information Technology for providing us the necessary support and details at the right time during the progressive reviews.

I would like to express our sincere and deep sense of gratitude to our Project Guide **Dr.P.Ajitha M.E. Ph.D.** for her valuable guidance, suggestions and constant encouragement paved way for the successful completion of my project work.

CERTIFICATE:

No.: 34350



एन एस आई सी
N S I C

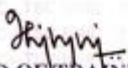
राष्ट्रीय लघु उद्योग निगम लिमिटेड
NATIONAL SMALL INDUSTRIES CORPORATION LIMITED
(A Govt. of India Enterprise)

NSIC - TECHNICAL SERVICES CENTRE
Sector B-24, Guindy Industrial Estate, Ekkaduthangal, Chennai - 600 032.

CERTIFICATE

This is to certify that Ms. **NIKITA ANGELINE DAVID** D/o. Shri. **VINOD DAVID**, student of III year B.Tech. (IT), Sathyabama Institute of Science and Technology has undergone "**SKILL DEVELOPMENT PROGRAM ON DATA ANALYTICS**" conducted by us for a period of one week (30 Hours) from 09.03.2023 to 14.03.2023.




HEAD OF TRAINING


HEAD OF CENTRE

ABSTRACT

Birth Rate projections are attempts to show how the human population statistics might change in the future. These projections are an important input to forecasts of the population's impact on this planet and humanity's future well-being. Models of population growth take trends in human development, and apply projections into the future. These models use trend-based-assumptions about how populations will respond to economic, social and technological forces to understand how they will affect fertility and mortality, and thus population growth. Projections of global human population are generally based on birth rates and death rates, and since these are difficult to predict very far into the future, forecasts of global population numbers and growth rates have changed over time.

In this work we proposed data analytics-based approach for predicting the birth rate based on details of the last 12 months and it will generate report, in which birth rate is for each and every month is depicted. This system performs various task like, finding months with highest number of births, sum of total number of births, months with lowest number of births in which months, number of multiple births.....etc. These issues could be overcome by using various data mining techniques. In this paper, we briefly analyzed the concept of birth rates analysis and birth rate prediction . On the basis of a performance evaluation, a best suited predictive model is suggested for the birth rate forecast. The results are summarized in terms of reliability and accuracy of efficient techniques taken for prediction and forecasting. We will also explore how such data can be used to obtain insights into forecasting behaviour, and the impact of such data on organizational forecasting.

TABLE OF CONTENTS

CHAPTER NO.	TITLE	PAGE NO.
	ABSTRACT	vi
	LIST OF FIGURES	ix
1.	INTRODUCTION	1
	1.1 FORECASTING	2
	1.2 BIRTH RATE FORECASTING	2
	1.3 BIRTH RATE PREDICTION	5
	1.5 SPECIFICATION	7
2.	LITERATURE SURVEY	8
	2.1 POPULATION AND GROWTH	8
	2.2 HISTORY OF POPULATION PROJECTION	9
	2.3 FERTILITY	10
3.	AIM & SCOPE	11
	3.1 AIM	11
	3.2 SCOPE	11
4.	METHODS AND ALGORITHM USED	12
	4.1 PROJECT DEVELOPMENT	12
	4.2 DATA ANALYTICS	13
	4.3 DESCRIPTION ANALYSIS	14
	4.4 SYSTEM REQUIREMENTS	18

	4.5 POWER BI	19
	4.6 METHODOLOGY	20
	4.7 STEPS	23
5.	RESULT AND DISCUSSION	28
	5.1 APENDIX	29
6.	SUMMARY &CONCLUSION	31
	6.1 FURURE WORKS	31
	REFERENCES	32

LIST OF FIGURES

FIGURE NO.	FIGURE NAME	PAGE NO.
1.1	FLOW CHART	3
1.2	BLOCK DIAGRAM	6
4.1	PROJECT DEVELOPMENT	10
4.2	EXCEL DATA	19
4.3	EXCEL DATA	19
4.4	EXCEL DATA	20
4.5	EXCEL DATA	20
4.6	TOTAL NUMBER OF BIRTH BY MONTH	21
4.7	TOTAL NUMBER OF TWINS	22
4.8	AGE OF MOTHERS	23
4.9	HEALTHY BABIES BY DISTRICT	24
4.10	BOYS AND GIRLS BY QUARTER	24
4.11	HEALTHY BABIES BY DISTRICT	25
4.12	TOTAL NUMBER OF BABIES	25
5.2.1	HEALTHY BABIES BY DISTRICT	26
5.2.2	TOTAL NUMBER OF BABIES	26
5.2.3	LINE CHART AND BAR CHART	27
5.2.4	DONUT CHART AND BAR CHART	27
5.2.5	BAR CHART	28
5.2.6	LINE CHART AND PIE CHART	28

CHAPTER 1

1.1 INTRODUCTION

Birth rate is the number of individuals born in a population in a given amount of time. The birth rate is one of the most basic and important measures in demography but its relevance is not limited to just demographers. Birth rates affect public policy and budgeting for education and health systems, and can have major impacts on the well-being of a country's population. Having tabs on the birth rate of a given area the birth rate and death rate of a given area provides insight into whether that population is increasing or decreasing in that area. A birth prediction model is based on data acquired from past birth rates and predicting on what the future birth rates would be like.

Arrangements conjecture is a noteworthy basic for enormous business orchestrating and right powerful, allowing associations to all the more promptly structure their business works out. Predictive modeling is a commonly used statistical technique to predict future behavior and is used to predict future population with the data of current and past birthrates. The desires are generally done by applying verifiable systems, for instance, backslide or the autoregressive–moving-typical (ARMA) taking into account recorded arrangements data. Regardless, these procedures simply work for explicit data. Such enormous quantities of components with complex interrelationships sway bargains and in all likelihood consolidate ones with a sensible degree of defenselessness. Using data mining, we can perceive potential models and headway consistency from most of the data.

1.2 FORECASTING

Forecasting is the process of projecting past demand into the future. Implementing a forecasting system enables you to assess current data and forecast a future pattern based on present data. It is a planning tool that enables planning and predicting of future. Overall, predicting birth rates can provide valuable insights into future demographic and societal trends, enabling organizations and policymakers to make informed decisions and allocate resources more effectively.

1.2.1 Types of Forecasting

- Quantitative
- Qualitative

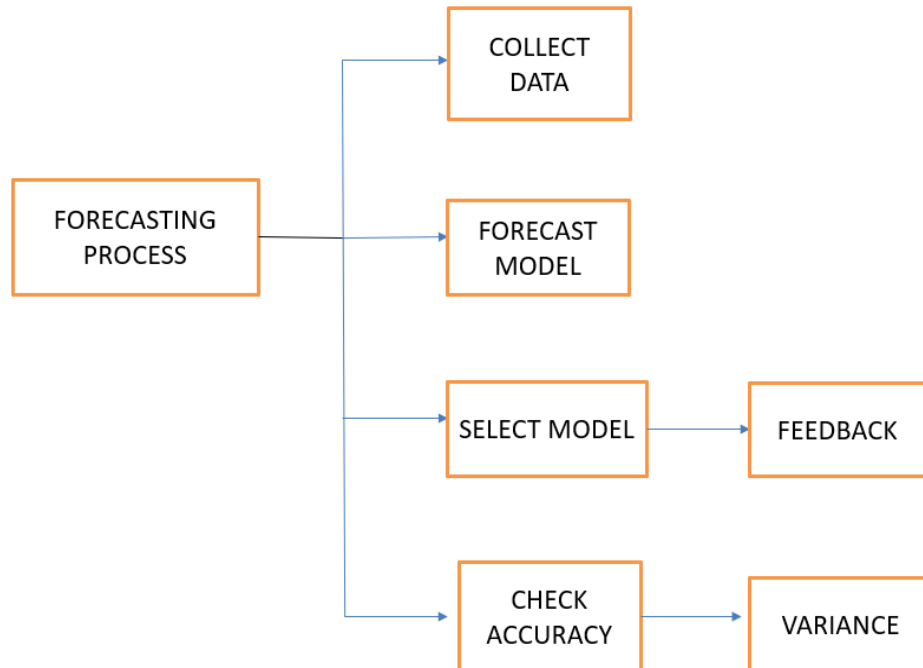
1.3 BIRTH RATE FORECASTING

Birth rates tell us a lot about community health, and are an important measure in overall health science. Health professionals closely monitor birth rates as they rise and fall, and measure these trends to track important changes and what they may mean for our society's future.

If you're interested in studying birth rates and why they are significant, learn more about this important health measure.

Birthrate forecasting is then used to keep tabs on population growth. Birth rate is the number of individuals born in a population in a given amount of time. The birth rate is one of the most basic and important measures in demography but its relevance is not limited to just demographers

1.4 FLOWCHART:



1.1 FLOW CHART

1.4.1 Pros and Cons of Birth Rate Prediction

Pros:

Resource planning: Predicting birth rates can help governments and organizations plan for future resource needs such as healthcare, education, and social services.

Economic forecasting: Birth rates can affect the size and composition of the workforce, and predicting future birth rates can help businesses and policymakers plan for changes in labour supply and demand.

Health planning: Predicting birth rates can also help healthcare organizations plan for future healthcare needs, such as the number of maternity wards or paediatricians needed.

Social policy: Predicting birth rates can inform social policy decisions related to issues such as family planning, childcare, and parental leave.

Environmental planning: Predicting birth rates can also inform environmental planning decisions related to issues such as carbon emissions and natural resource consumption

Cons:

Uncertainty: Birth rate predictions are based on assumptions about future trends in fertility rates, mortality rates, and migration patterns. These assumptions may not hold true, leading to inaccurate predictions.

Complexity: Birth rates are influenced by a complex array of factors, including cultural, social, economic, and political factors. It can be difficult to capture all of these factors in a predictive model, leading to potential inaccuracies.

Ethical concerns: Some people may have ethical concerns about predicting birth rates, particularly if the predictions are used to support policies that restrict reproductive rights or discriminate against certain populations.

Lack of context: Birth rate predictions provide only a broad overview of future trends, and may not capture important contextual factors that can influence birth rates, such as changes in social norms or policies.

Limited usefulness: Predicting birth rates may have limited usefulness in the short-term, as birth rates can be affected by unpredictable events such as natural disasters, epidemics, or economic crises.

1.5 BIRTH RATE PREDICTION

Birth rate prediction is the process of estimating the number of live births that will occur in a given population during a specified period of time, usually based on past trends and current conditions. Birth rate prediction can involve using mathematical models, statistical analysis, and demographic data to estimate future birth rates.

Birth rate prediction is important for a variety of reasons. It can help governments and organizations plan for future resource needs such as healthcare, education, and social services. It can also inform economic policy and strategy, research into population trends, and social policy decisions related to issues such as family planning and parental leave.

There are various factors that can influence birth rates, such as changes in fertility rates, mortality rates, and migration patterns. Birth rate predictions may be based on assumptions about these factors, and may be subject to uncertainty and error.

Overall, birth rate prediction can provide valuable insights into future demographic and societal trends, enabling organizations and policymakers to make informed decisions and allocate resources more effectively

1.5.1 BENEFITS OF SALES PREDICTION:

- Set better goals for future based on past data
- **Forecasting:** Predicting birth rates can help businesses and policymakers forecast changes in labor supply and demand, which can inform economic policy and strategy.
- **Research:** Birth rate predictions can also inform research into trends in population growth, demographics, and public health. This research can help identify areas where targeted interventions may be needed to improve outcomes.
- **Policy-making:** Predicting birth rates can inform social policy decisions related to issues such as family planning, childcare, and parental leave. This can help ensure that policies are based on accurate information and are more likely to achieve their intended goals.

1.5.2 SYSTEM ARCHITECTURE:

BLOCK DIAGRAM:

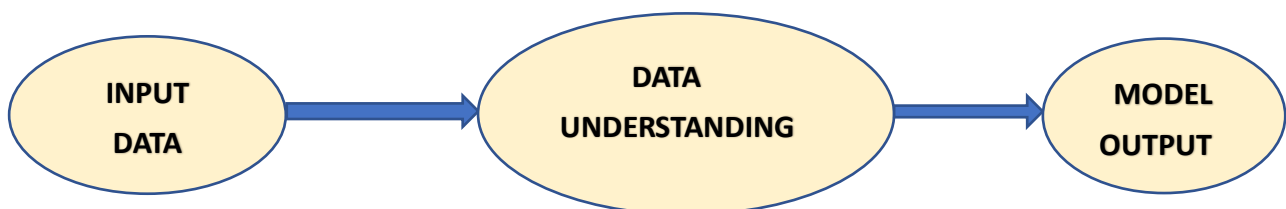


FIG 1.2 BLOCK DIAGRAM

1.6 SPECIFICATIONS

1.6.1 HARDWARE CONFIGURATION

- Processor - I5
- Speed - 3 GHz
- RAM - 8GB (min)
- Hard Disk - 500 GB
- Key Board - Standard Windows Keyboard
- Mouse - Two or Three Button Mouse
- Monitor - LCD
- Ethernet connection :(LAN)

1.6.2 SOFTWARE CONFIGURATION

- Microsoft Excel sheet
- Power BI Application
- Web Browser

CHAPTER 2

LITERATURE SURVEY

2.1 POPULATION GROWTH

With the development of social production and the accumulation of material conditions, the population changes more and more, and the supporting resources are also constantly changing. In order to help people allocate resources rationally, it is necessary to first predict population data such as population number, population birth rate, and population growth rate. To this end, this paper proposes a model for analyzing population data, first obtaining the population; then analyzing the data; then modeling the population number, population birth rate, and population growth rate, and obtained the correct values of 0.9965612798125165, 0.8081945627540684, and 0.6572562263495255, respectively. Rate and dig out more useful information. To a certain extent, the model has a certain use value and can be promoted and used, thereby reducing the tedious work of some people.

Population growth prediction shows the future rate of fertility, mortality and migration of people of a country. It is very important for the population and health system. Nowadays, Machine learning concepts are most growing and popular for predicting future values. In order to predict population growth, the machine learning concept applied to build the map between year and population growth. The paper investigates the population growth of Indian government population data using time series forecasting machine learning techniques and analyzed by Linear regression, Support Vector Regression, Multilayer perceptron and Decision tree classifier. The optimum prediction method is based on the technique which gives very less error rate. The increment or degradation of instances in datasets do not affect the performance of the techniques is also analyzed. The obtained result shows that the linear regression gives less error than the other classifier to predict population growth of India.

2.2 HISTORY OF POPULATION PROJECTION

Projections of global human population are generally based on birth rates and death rates, and since these are difficult to predict very far into the future, forecasts of global population numbers and growth rates have changed over time.

Walter Greiling projected in the 1950s that world population would reach a peak of about nine billion in the 21st century and then stop growing after an improvement in public health in less developed countries. Estimates published in the early 2000s tended to predict that the population of Earth would stop increasing around 2070.[13] For example, in a 2004 long-term prospective report, the United Nations Population Division projected that world population would peak at 9.2 billion in 2075 and then stabilize at a value close to 9 billion out to as far as the year 2300.

Jørgen Randers, one of the authors of the seminal 1972 long-term simulations in *The Limits to Growth*, offered an alternative scenario in a 2012 book, arguing that traditional projections insufficiently take into account the downward impact of global urbanization on fertility. Randers' "most likely scenario" predicted a peak in world population in the early 2040s at about 8.1 billion people, followed by decline. In 2012, the UN changed its prediction to the effect that no maximum would likely be reached in the 21st century, and that by the year 2100 world population would increase to somewhere in the range 9.6 to 12.3 billion with 10.9 billion being the midpoint of that range.[16] The main reason for the revision was a recognition that the high fertility rate in Africa was not declining as fast had been previously assumed]

Another 2014 paper by demographers from several universities, using data from the UN's 2014 report and their own statistical methods, forecast that the world's population would reach about 10.9 billion in 2100 and continue growing thereafter. In 2017 the UN predicted that global population would reach 11.2 billion by 2100 and still be growing then at the rate of 0.1% per year.[19]

The most recent 2022 revision of the UN's *World Population Prospects* report[20] represents a departure from the pattern of the previous ten years and expects that a slowing of the population growth rate will lead to a population peak of 10.4 billion in the 2080s, after which it would then begin to slowly fall. This shift from earlier projections of peak population and predicted date of zero population growth comes

2.3 FERTILITY

from a more rapid drop in Africa's birth rate than previous projections had expected.[21] For example, the 2012 report predicted that the population of Nigeria, Africa's most populous country, would rise to 914 million by 2100; the 2022 report lowers that to 546 million, a reduction of 368 million. Jose Rimon of Johns Hopkins University has suggested that "We have been underestimating what is happening in terms of fertility change in Africa. Africa will probably undergo the same kind of rapid changes as east Asia did

Fertility is expressed as the total fertility rate (TFR), a measure of the number of children on average that a woman will bear in her lifetime. With longevity trending towards uniform and stable values worldwide, the main driver of future population growth will be the evolution of the fertility rate. Where fertility is high, demographers generally assume that fertility will decline and eventually stabilize at about two children per woman.

During the period 2015–2020, the average world fertility rate was 2.5 children per woman, about half the level in 1950–1955 (5 children per woman). In the medium variant, global fertility is projected to decline further to 2.2 in 2045-2050 and to 1.8 in 2095–2100

Predictive models have a long history in clinical medicine. One well-known example is the Framingham Risk Score, which was first developed in 1967.¹ Such models have proliferated throughout clinical practice to inform management and interventions, including preventive approaches. More recently, researchers have developed prediction models beyond individual clinical applications, for population health uses. While there is no universal definition of population health, it generally encompasses 'the health outcomes of a group of individuals, including the distribution of such outcomes within the group'.⁴ Similarly to clinical medicine, population-level models can be used to identify high-risk groups, directing the implementation of preventive interventions.

CHAPTER 3

AIM AND SCOPE

AIM:

The aim of birth rate prediction is to provide estimates of future population size, structure, and distribution based on past and present data. It is a crucial tool for governments, businesses, and organizations in planning for future resource allocation, infrastructure development, and social and economic policies.

SCOPE:

The scope of birth rate prediction includes analyzing and projecting trends in population growth, fertility rates, mortality rates, migration, and age structure. It can be used at various levels, such as national, regional, and local. It can be used to forecast the total population, as well as specific demographic groups such as age, sex, and ethnicity.

It is important for a variety of reasons. For governments, it is essential in planning for future needs such as healthcare, education, housing, and employment. It can also inform policies related to social security, taxation, and immigration.

CHAPTER 4

METHODS & ALGORITHM USED

4.1 PROJECT DEVELOPMENT:

In this section, there is an overview of the process of data mining and data modelling, from collecting the data, through the data preparation and finally the data modeling. Data cleaning and formatting can be considered as the most critical part of the whole project according to several data scientists. Figure 3.1 shows how the process of data mining works to extract knowledge using algorithms.

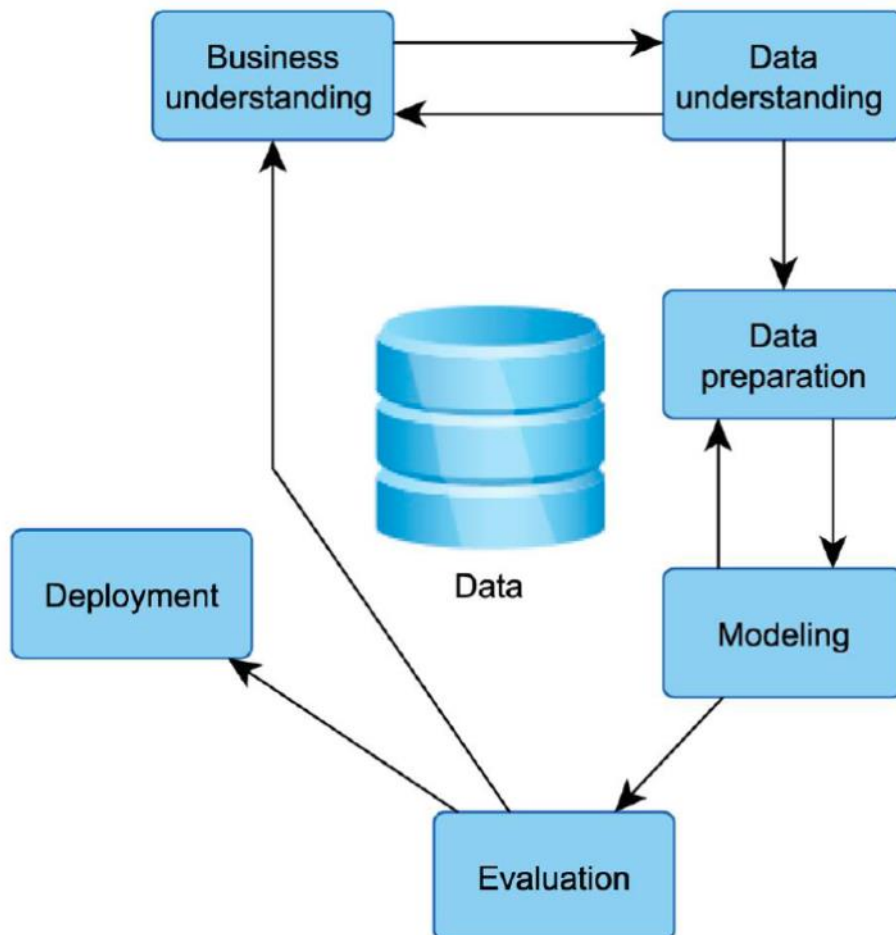


Fig:4.1 Project Development

4.2 DATA ANALYTICS:

The process of data analysis, or alternately, data analysis steps, involves gathering all the information, processing it, exploring the data, and using it to find patterns and other insights. The process of data analysis consists of: Data Requirement Gathering: Ask yourself why you're doing this analysis, what type of data you want to use, and what data you plan to analyses.

4.2.1 Data Collection:

Guided by your identified requirements, it's time to collect the data from your sources. Sources include case studies, surveys, interviews, questionnaires, direct observation, and focus groups. Make sure to organize the collected data for analysis.

4.2.2 Data Cleaning:

Not all the data you collect will be useful, so it's time to clean it up. This process is where you remove white spaces, duplicate records, and basic errors. Data cleaning is mandatory before sending the information on for analysis.

4.2.3. Data Analysis:

Here is where you use data analysis software and other tools to help you interpret and understand the data and arrive at conclusions. Data analysis tools include Excel, Python, R, Looker, Rapid Miner, Charito, Meta base, Rehash, and Microsoft Power BI.

4.2.4. Data Interpretation:

Now that you have your results, you need to interpret them and come up with the best courses of action based on your findings.

4.2.5. Data Visualization:

Data visualization is a fancy way of saying, "graphically show your information in a way that people can read and understand it." You can use charts, graphs, maps, bullet points, or a host of other methods. Visualization helps you derive valuable insights by helping you compare datasets and observe relationships.

4.3 Types of Data Analysis:

The four types of data analysis are:

1. Descriptive Analysis
2. Diagnostic Analysis
3. Predictive Analysis
4. Prescriptive Analysis

4.3.1. *DESCRIPTIVE ANALYSIS:*

Descriptive analytics answer the question, “What happened?”. This type of analytics is by far the most commonly used by customers, providing reporting and analysis centered on past events. It helps companies understand things such as:

- How much did we sell as a company?
- What was our overall productivity?
- How many customers churned in the last quarter?

Descriptive analytics is used to understand the overall performance at an aggregate level and is by far the easiest place for a company to start as data tends to be readily available to build reports and applications. It’s extremely important to build core competencies first in descriptive analytics before attempting to advance upward in the data analytics maturity model. 23 Core competencies include things such as data modeling fundamentals, communicating data with right visualization and basic

dashboard skills. It’s likely you’ve adopted some form of descriptive analytics internally, whether that be static P&L statements, PDF reports, or reporting within an analytics tool. For a true descriptive analytics program to be implemented, the concepts of repeatability and automation of tasks must be top of mind. Repeatability in that a data process is standardized and can be regularly applied with minimal effort

(think a weekly sales report), and automation in that complex task (VLOOKUPS, merging of excel spreadsheets, etc.) are automated—requiring little to no manual intervention.

4.3.2. DIAGNOSTIC ANALYSIS:

Diagnostic analytics, just like descriptive analytics, uses historical data to answer a question. But instead of focusing on “what”, diagnostic analytics addresses the critical question of why an occurrence or anomaly occurred within your data. Diagnostic analytics also happens to be the most overlooked and skipped step within the analytics maturity model. Anecdotally, I see most customers attempting to go from “what happened” to “what will happen” without ever taking the time to address the “why did it happen” step. This type of analytics helps companies answer questions such as:

- Why did our company sales decrease in the previous quarter?
- Why are we seeing an increase in customer churn?
- Why is a specific basket of products vastly outperforming their prior year sales figures? Diagnostic analytics tends to be more accessible and fit a wider range of use cases than machine learning/predictive analytics. You might even find that it solves some business problems you earmarked for predictive analytics use cases. Being at the diagnostic analytics phase likely means you’ve adopted a modern analytics tool. Most modern analytics tools contain a variety of search-based, or lightweight artificial intelligence capabilities. ²⁴ These features allow for detailed insights a layer deeper (for example: the Key Drivers visualization in Power BI, or Qlik’s search-based insight functionality). To be clear, these are an effective lightweight means to address diagnostic analytics use cases but are not a means to a full-scale implementation. Software vendors like Sisú have built their core business around addressing diagnostic analytics use cases (what they call “augmented analytics”) and are a great bet. Diagnostic analytics is an important step in the maturity model that unfortunately tends to get skipped or obscured. If you cannot infer why your sales decreased 20% in 2020, then jumping to predictive analytics and trying to answer “what will happen to sales in 2021” is a stretch in advancing upward in the analytics maturity model.

4.3.3. PREDICTIVE ANALYSIS:

Predictive analytics is a form of advanced analytics that determines what is likely to happen based on historical data using machine learning. Historical data that comprises the bulk of descriptive and diagnostic analytics is used as the basis of building predictive analytics models. Predictive analytics helps companies address use cases such as:

- Predicting maintenance issues and part breakdown in machines.
- Determining credit risk and identifying potential fraud.
- Predict and avoid customer churn by identifying signs of customer dissatisfaction.

At the outset of any predictive analytics build, three core elements need to be established:

- Identify a problem to solve,
- Define what is you want to predict, and
- State what you will achieve by doing so. To start you should collect existing data, organize data in a useful way to allow for data modeling, cleanse your data and review overall quality, and finally determine your modeling objective. 25 While modeling takes up the spotlight in predictive analytics, data prep is a crucial step that needs to happen first. This is why organizations with a rock-solid foundation in descriptive and diagnostic analytics are better equipped to handle predictive analytics. Simply put, the time and effort to prep, transform, and ensure data quality for retrospective reporting has already taken place. The groundwork should be relatively well laid to quickly identify and leverage data for the modeling phase. I always encourage customers with well-defined KPIs and business logic in a specific business reporting area (think sales reporting for example) to use that as the first predictive analytics use case. The goal is to derive value quickly, and there is no better place to start than an area where you know data is well defined and of high quality.

4.3.4. PRESCRIPTIVE ANALYSIS:

Prescriptive analytics is the fourth and final pillar of modern analytics. Prescriptive analytics pertains to true guided analytics where your analytics is prescribing or guiding you toward a specific action to take. It is effectively the merging of descriptive, diagnostic, and predictive analytics to drive decision making. Existing scenarios or conditions (think your current fleet of freight trains) and the ramifications of a decision or occurrence (parts breakdown on the freight trains) are applied to create a guided decision or action for the user to take (proactively buy more parts for preventative maintenance). Prescriptive analytics requires strong competencies in descriptive, diagnostic, and predictive analytics which is why it tends to be found in highly specialized industries (oil and gas, clinical healthcare, finance, and insurance to name a few) where use cases are well defined. Prescriptive analytics help to address use cases such as:

- Automatic adjustment of product pricing based on anticipated customer demand and external factors.

- Flagging selects employees for additional training based on incident reports in the field. 26 Prescriptive analytics' primary aim is to take the educated guess or assessment out of data analytics and streamline the decision-making process. Prescriptive analytics is commonly considered the merging of descriptive, diagnostic, and predictive analytics. Getting started isn't so much a step-by-step list but rather the time and effort up front to build your competencies within the analytics maturity curve. Simply put, there is no starting point in prescriptive analytics without the requisite first three pillars of modern analytics being established first. If you're ready for prescriptive analytics, then quantifying your call to action and the underlying criteria will be the first requirement. For example: if the use case is to call corrective action for an employee (i.e. – additional training based on poor performance) then the factors that necessitate

this action must be firmly established and the action itself must be clearly defined. Knowing how each kind of analytics helps you better understand your data and how to use it.

.4.4 System Requirements:

4.4.1 Windows:

- Microsoft® Windows® 7/8/10 64-bit
- 4 GB RAM minimum, 8 GB RAM recommended
- 2 GB of available disk space minimum,

- 4 GB Recommended 500 MB for IDE + 1.5 GB for Android SDK and emulator system image
- 1280 x 800 minimum screen resolution

4.4.2 Mac:

- Mac® OS X® 10.10 Yosemite or higher, up to 10.14 macOS Mojave
- 4 GB RAM minimum, 8 GB RAM recommended
- 2 GB of available disk space minimum,
- 4 GB Recommended 500 MB for IDE + 1.5 GB for Android SDK and emulator system image

4.4.3 Linux:

- GNOME or KDE desktop - Tested on gLinux based on Debian.
- 64-bit distribution capable of running 32-bit applications
- GNU C Library glibc 2.19 or later 17
- 4 GB RAM minimum, 8 GB RAM recommended
- 2 GB of available disk space minimum.

4.5 POWER BI:

Power BI is an interactive data visualization software product developed by Microsoft with a primary focus on business intelligence. It is part of the Microsoft Power Platform. Power BI is a collection of software services, apps, and connectors that work together to turn unrelated sources of data into coherent, visually immersive, and interactive insights. Data may be input by reading directly from a database, webpage,

or structured files such as spreadsheets, CSV, XML, and JSON. Microsoft Power BI is a business intelligence (BI) platform that provides nontechnical business users with tools for aggregating, analyzing, visualizing and sharing data. 27 Power BI's user interface is fairly intuitive for users familiar with Excel, and its deep integration with other Microsoft products makes it a versatile self-service tool that requires little upfront training. Users can download an application for Windows 10, called Power BI Desktop, and native mobile apps for Windows, Android and iOS devices. There is also Power BI Report Server for companies that must maintain their data and reports on premises. That version of Power BI requires a special version of the desktop app -- aptly called Power BI Desktop for Power BI Report Server.

4.5.1 USES OF POWER BI:

Microsoft Power BI is used to find insights within an organization's data. Power BI can help connect disparate data sets, transform and clean the data into a data model and create charts or graphs to provide visuals of the data. All of this can be shared with other Power BI users within the organization. The data models created from Power BI can be used in several ways for organizations, including the following:

- telling stories through charts and data visualizations;
- examining "what if" scenarios within the data;
- creating reports that can answer questions in real time and help with forecasting to make sure departments meet business metrics. Power BI can also provide executive dashboards for administrators or managers, giving management more insight into how departments are doing

4.6 METHODOLOGY:

- The project is implemented in Microsoft excel and Microsoft power Bi.
- We need to collect the data set for birth rate of babies for a particular area, over a year or 365 days.

- So, we are creating a data set for birth rate
- That includes:
 1. Overweight
 2. Underweight
 3. Normal babies
 4. Total babies
 5. Health of Baby
 6. Total number of babies in Chennai
 7. Total number of babies in Salem
 8. Number Of Boy and Girl Babies
 9. Type of delivery
- Now enter the dataset in Microsoft excel sheet as per the date and month as show in the fig 4.2

EXCEL DATA:

DATES	OVERWEIGHT	UNDERWEIGHT	NORMAL	TOTAL BABIES	C-SECTION	UNHEALTHY	HEALTHY	MOTHERS UNDER 25	MOTHERS OVER 25	BOY	GIRL	NO OF TWINS	SALEM	CHENNAI
01-01-2022	954	494	32561	34009	3427	1254	32755	5132	27429	13949	20060	9133	3960	30049
02-01-2022	129	132	24986	25247	7637	1434	23813	6262	18724	12390	12857	7759	4592	20655
03-01-2022	369	262	16086	16717	4176	1261	15456	5910	10176	12542	4175	2989	9519	7198
04-01-2022	651	910	16352	17913	1621	1350	16563	6894	11019	12537	5376	3614	7751	10162
05-01-2022	127	894	23452	24473	6970	1135	23338	5321	18131	13552	10921	7218	6964	17509
06-01-2022	233	321	22342	22896	2355	1374	21522	9258	13638	13668	9228	4413	7934	14962
07-01-2022	454	258	23413	24125	3162	1336	22789	7782	16343	14602	9523	8033	8135	15990
08-01-2022	238	782	34215	35235	4387	1101	34134	7224	28011	12225	23010	5697	6250	28985
09-01-2022	343	224	93452	94019	3138	1235	92784	1228	92791	14989	79030	4629	9189	84830
10-01-2022	120	228	25421	25769	2651	1131	24638	8437	17332	13764	12005	6664	8366	17403
11-01-2022	217	437	98324	98978	9928	1137	97841	9555	88769	14099	84879	4902	1945	97033
12-01-2022	797	555	23255	24607	1271	1456	23151	7962	16645	13826	10781	5528	3269	21338
13-01-2022	404	962	15462	16828	2840	1481	15347	8674	15933	14667	2161	8294	5087	11741
14-01-2022	944	674	27857	29475	9973	1273	28202	9681	19794	13923	15552	2866	7940	21535
15-01-2022	619	681	24342	25642	3226	1269	24373	7136	18506	12667	12975	1114	8530	17112
16-01-2022	973	136	19462	20571	8019	1256	19315	8275	12296	13969	6602	3942	1883	18688
17-01-2022	942	275	25752	26969	1446	1226	25743	7426	19543	14411	12558	8705	5143	21826
18-01-2022	426	94317	95493	95493	2783	1165	94328	8752	86741	12094	83399	1261	3063	92430
19-01-2022	501	752	23987	25240	1644	1478	23762	7373	17867	13402	11838	6125	7427	17813
20-01-2022	129	373	97653	98155	1189	1344	96811	9882	87771	13190	84965	2876	2597	95558
21-01-2022	284	882	27839	29005	1984	1413	27592	8834	20171	14852	14153	8789	2981	26024
22-01-2022	280	834	78372	79486	3298	1314	78172	8327	71159	13660	65826	5795	3342	76144
23-01-2022	340	327	38276	38943	8361	1368	37575	7532	31411	14763	24180	7552	9889	29054
24-01-2022	590	532	37392	38514	6638	1222	37292	8254	30260	12940	25574	8419	6605	31959
25-01-2022	455	254	19873	20582	5618	1324	19258	7851	12731	13929	6653	2569	3952	16630
26-01-2022	213	851	28076	29140	3393	1485	27655	8586	20554	12392	16748	5297	4391	24749
27-01-2022	511	586	17367	18464	2974	1008	17456	7521	10943	12593	5871	3151	9252	9212
28-01-2022	223	521	27628	28372	4350	1149	27223	7917	20455	12171	16201	5455	8850	19522

FIG: 4.2 EXCEL DATA

D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W
26252	26994	1778	1170	25824	8355	18639	14742	12252	6339	5165	21829								
33434	34214	4315	1342	32872	9709	24505	14001	20213	5087	4464	29750								
85431	86778	5732	1229	85549	9786	76992	13601	73177	2563	4519	82259								
25410	26745	2196	1127	25618	8832	17913	13044	13701	8025	7214	19531								
21352	22887	4585	1246	21641	8845	14042	12940	9947	3185	3049	19838								
43179	44149	3954	1156	42993	9882	34267	13028	31121	5005	8565	35584								
23231	24477	5027	1280	23197	9726	14751	12559	11918	9300	1369	23108								
31354	32885	3423	1064	31821	9394	23491	13079	19806	9782	7397	25488								
82311	82832	7008	1117	81715	9867	72965	14589	68243	1578	1687	81145								
23214	25075	2408	1017	24058	9418	15657	13671	11404	2340	4857	20218								
44214	45278	8423	1125	44153	8606	36672	13877	31401	3688	9737	35541								
34201	35085	4851	1327	33758	9872	25213	13884	21201	4355	3897	31188								
87987	89193	6912	1266	87927	9421	79772	12403	76790	1952	3772	85421								
23718	24582	1244	1438	23144	8769	15813	14914	9668	9186	3533	21049								
33301	34413	4271	1020	33393	9362	25051	13796	20617	1552	3182	31231								
23831	24792	5693	1101	23691	9967	14825	12038	12754	6206	9839	14953								
64821	66110	8746	1242	64868	8256	57854	14582	51528	9587	3272	62838								
31928	32725	2573	1481	31244	8584	24141	13552	19173	2586	2813	29912								
52183	52907	5527	1381	51526	9335	43572	12134	40773	3020	3440	49467								
31098	32302	2776	1181	31121	9495	22807	13060	19242	1989	8293	24009								
22131	22776	2727	1261	21515	9357	13419	12794	9982	7322	8190	14586								
18312	19302	8558	1145	18157	8980	10322	14975	4327	6522	8335	10967								
33123	34892	4076	1398	33494	8294	26598	13615	21277	1177	3421	31471								
21312	22190	9903	1440	20750	8574	13616	14459	7731	1866	3561	18629								
83131	83994	2962	1054	82940	9175	74819	12837	71157	5835	2282	81712								
26423	26828	7778	1038	25790	9422	17406	13116	13712	6617	3474	23354								
31313	32656	2757	1333	31323	8341	24315	14874	17782	5513	4444	28212								
24311	24834	1667	1055	23779	8783	16051	13512	11322	5328	8765	16069								

FIG: 4.3 EXCEL DATA

	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W
162	29245	30917	6839	1364	29553	8971	21946	12263	18654	1143	9781	21136								
163	22434	23626	6184	1213	22413	9329	14297	14087	9539	6474	6040	17586								
164	26252	26994	1778	1170	25824	8355	18639	14742	12252	6339	5165	21829								
165	34344	34214	4315	1342	32872	9709	24505	14001	20213	5087	4464	29750								
166	85431	86778	5732	1229	85549	9786	76992	13601	73177	2563	4519	82259								
167	25410	26745	2196	1127	25618	8832	17913	13044	13701	8025	7214	19531								
168	21352	22887	4585	1246	21641	8845	14042	12940	9947	3185	3049	19838								
169	43179	44149	3954	1156	42993	9882	34267	13028	31121	5005	8565	35584								
170	23231	24477	5027	1280	23197	9726	14751	12559	11918	9300	1369	23108								
171	31354	32885	3423	1064	31821	9394	23491	13079	19806	9782	7397	25488								
172	82311	82832	7008	1117	81715	9867	72965	14589	68243	1578	1687	81145								
173	23214	25075	2408	1017	24058	9418	15657	13671	11404	2340	4857	20218								
174	44214	45278	8423	1125	44153	8606	36672	13877	31401	3688	9737	35541								
175	34201	35085	4851	1327	33758	9872	25213	13884	21201	4355	3897	31188								
176	87987	89193	6912	1266	87927	9421	79772	12403	76790	1952	3772	85421								
177	23718	24582	1244	1438	23144	8769	15813	14914	9668	9186	3533	21049								
178	33301	34413	4271	1020	33393	9362	25051	13796	20617	1552	3182	31231								
179	23831	24792	5693	1101	23691	9967	14825	12038	12754	6206	9839	14953								
180	64821	66110	8746	1242	64868	8256	57864	14582	51528	9587	3272	60838								
181	31928	32725	2573	1481	31244	8584	24141	13552	19173	2586	2813	29912								
182	52183	52907	5527	1381	51526	9335	43572	12134	40773	3020	3440	49467								
183	31098	32302	2776	1181	31121	9495	22807	13060	19242	1989	8293	24009								
184	22131	22776	2727	1261	21515	9357	13419	12794	9982	7322	8190	14586								
185	18312	19302	8558	1145	18157	8980	10322	14975	4327	6522	8335	10967								
186	33123	34892	4076	1398	33494	8294	26598	13615	21277	1177	3421	31471								
187	21312	22190	9903	1440	20750	8574	13616	14459	7731	1866	3561	18629								
188	83131	83994	2962	1054	82940	9175	74819	12837	71157	5835	2282	81712								
189	26423	26828	7778	1038	25790	9422	17406	13116	13712	6617	3474	23354								
190	31313	32656	2757	1333	31323	8341	24315	14874	17782	5513	4444	28212								

FIG: 4.4 EXCEL DATA

	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W
337	36543	37746	4067	1206	36540	8145	29601	12769	24977	6639	1616	36130								
338	23625	24091	7906	1390	22701	8127	15964	13706	10385	3366	9440	14651								
339	67637	68293	1176	1326	66967	9139	59154	13492	54801	8832	8270	60023								
340	22837	23622	4934	1414	22208	7359	16263	13348	10274	9871	3383	20239								
341	32648	33404	7327	1028	32376	8815	24589	12362	21042	7444	7698	25706								
342	85648	87095	1280	1003	86092	7866	79229	14842	72253	7592	6103	80992								
343	24567	26410	5490	1093	25317	9532	16878	14650	11760	8108	2520	23890								
344	32534	33669	5889	1080	32589	8229	25440	12189	21480	1616	7512	26157								
345	27234	28231	4477	1364	26867	7614	20617	14854	13377	2027	7772	20459								
346	54263	55493	8323	1220	54273	8955	46538	14563	40930	6413	5785	49708								
347	23245	25148	9343	1050	24098	8105	17043	14949	10199	2751	5622	19526								
348	22378	22942	4677	1113	21829	8815	14127	13254	9688	8696	6526	16416								
349	32134	33492	1689	1274	32218	7255	26237	13344	20148	9066	7625	25867								
350	63214	64020	7960	1034	62986	8736	55284	14299	49721	7968	3141	60879								
351	63245	64236	1326	1289	62947	8319	55917	13893	50343	6025	7287	56949								
352	34352	35385	9010	1240	34145	9711	25674	13564	21821	6403	4757	30628								
353	25438	26666	5712	1190	25476	9734	16932	12511	14155	1591	9622	17044								
354	19686	21064	2682	1401	19663	8497	12567	12869	8195	6091	3073	17991								
355	23456	24383	1946	1364	23019	9528	14855	12390	11993	4384	1403	22980								
356	84532	85957	8313	1411	84546	8188	77769	14845	71112	2383	3715	82242								
357	34563	35048	4482	1256	33792	9723	25325	14574	20474	1783	9298	25750								
358	53456	54316	5025	1022	53294	8277	46039	12232	42084	7003	1347	52969								
359	24329	25042	9414	1032	24010	8729	16313	14121	10921	1479	9416	15626								
360	25642	27302	9372	1305	25997	8626	18676	14348	12954	1364	5255	22047								
361	25687	27239	2563	1159	26080	8411	18828	14511	12728	3793	1859	25380								
362	34528	35211	9607	1175	34036	7836	27375	13272	21939	7055	1004	34207								
363	44532	46286	8677	1136	45150	9517	36769	14709	31577	3389	6675	39611								
364	24632	25660	5142	1074	24586	8704	16956	12025	13635	5381	7201	18459								
365	35683	37169	9449	1303	35866	7446	29723	14254	22915	7270	9632	27537								

FIG: 4.5 EXCEL DATA

4.7 STEPS:

- Here our model is used to predict birth of babies in a particular area based on the data given
- So, we are entering all the data of our model like date, location, gender of baby, number of babies born, type of delivery etc.
- Import the excel data in the Power Bi
- Create the required KPI'S
- Here in our project, we created pie chart, bar chart, forecasting etc.
- We also created Q&A Kpi which allows you to ask the data model questions based on the updated data
- Now we can easily predict the number of births and health of babies by using the kpi's
- We can also identify ranges of birth percentage every month

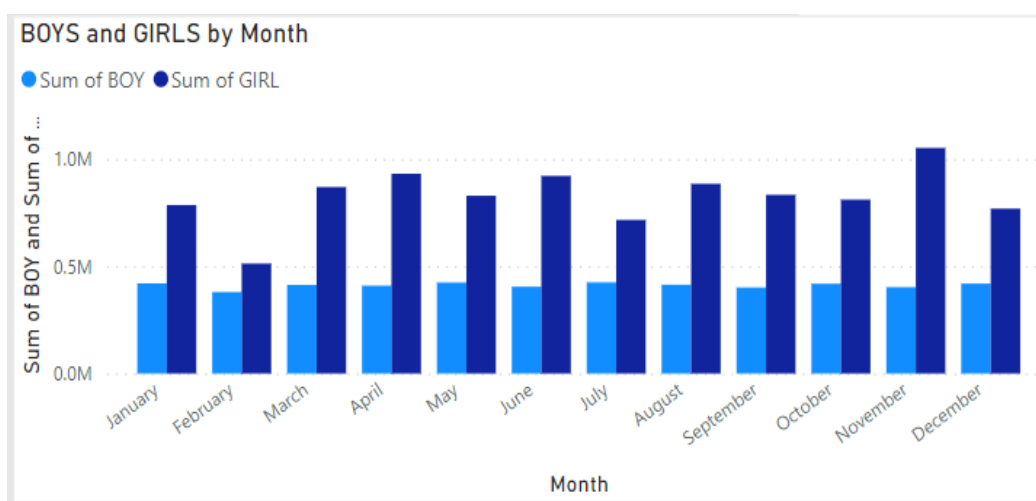


FIG: 4.6 TOTAL NUMBER OF BIRTH BY MONTH

- . Here we can see that in the month of November the birth of girl babies are higher in number
- The number of boy babies are somewhat similar comparatively throughout the year
- The lowest number of girl babies is in the month of February
- X axis consists of months, and Y axis consists of percentage of babies.

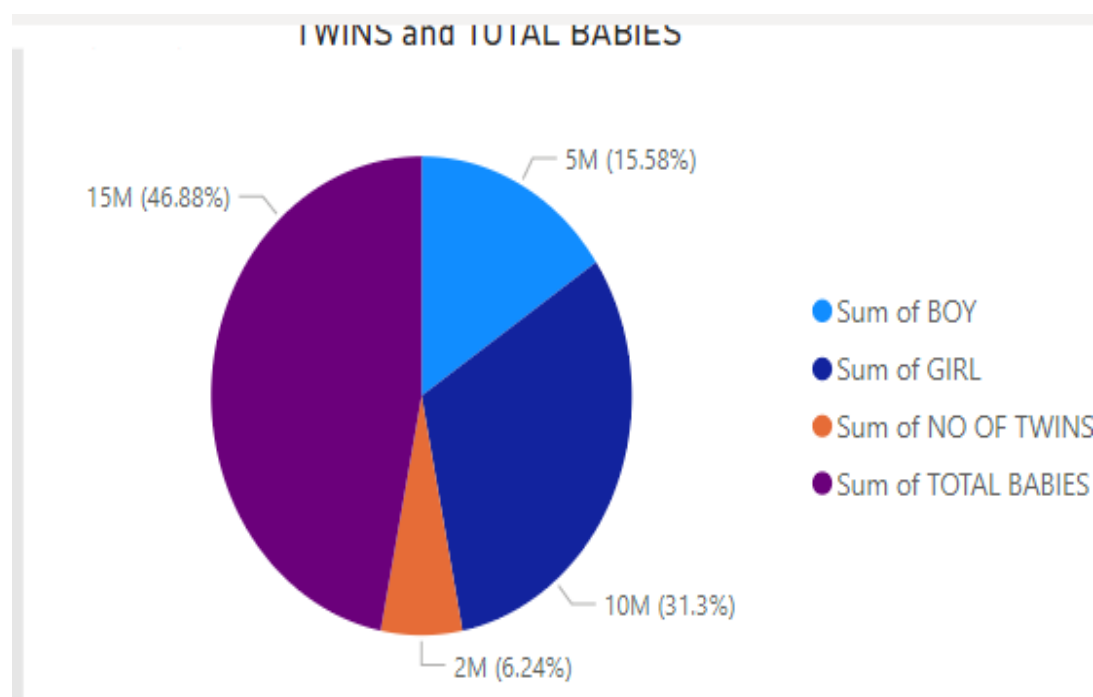


Fig:4.7 TOTAL NUMBER OF TWINS

- This pie chart is based on the given data .
- This pie chart consists of data number of boy babies, number of girl babies, multiple babies, total number of babies.
- Number of boy babies are a percentage of 15.58% 5M.

- Number of girl babies are a percentage of 31.3% 10M
- Number of multiple births is 6.24%
- The percentage of birth of girl babies is comparatively higher than number of boy babies in an area.

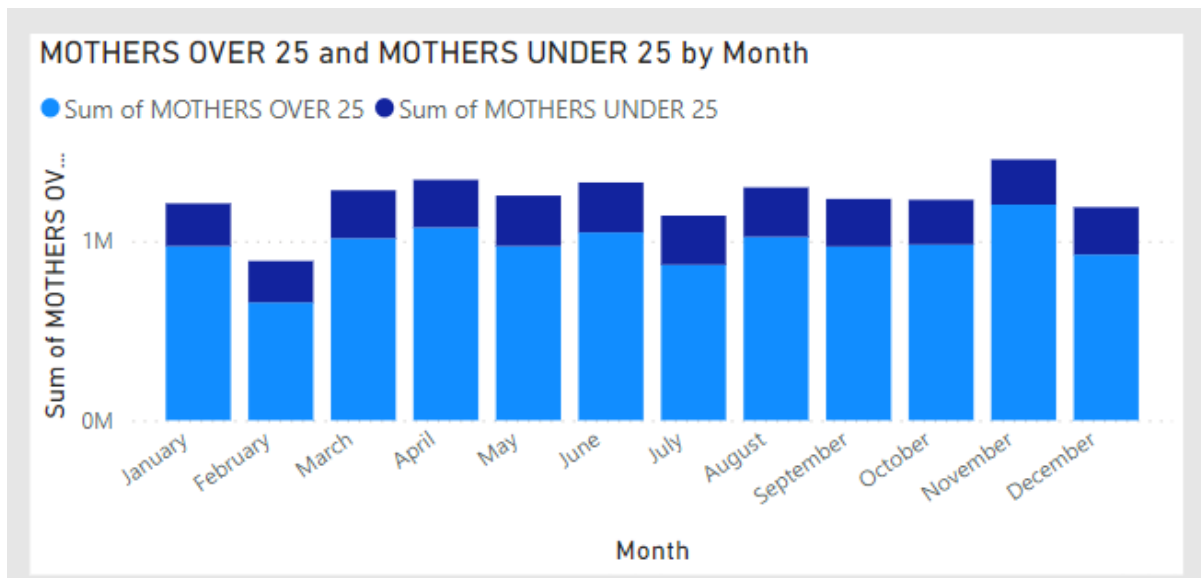


FIG:4.8 AGE OF MOTHERS

- This stacked column chart represents the ages of mothers who give birth over 12 months which helps analyze the fertility of mothers.
- By analyzing the fertility rates of mothers over the months we can predict the birth rates of future.
- This can help predict future population trends.
- X axis consists of all the 12 months
- Y axis consists of mothers age.

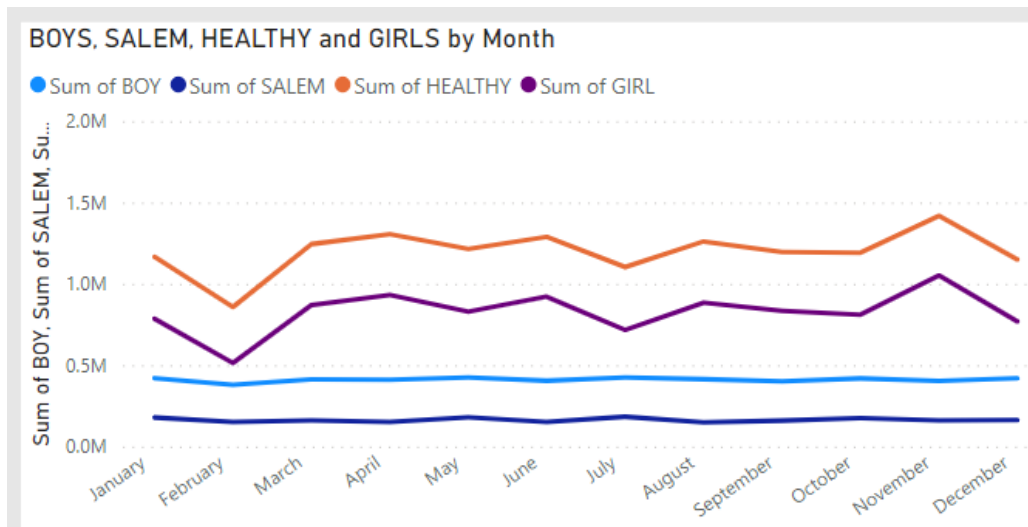


FIG :4.9 HEALTHY BABIES BY DISTRICT

- Here it's a simple line graph
- where x axis represents months and y axis boy babies, girl babies, number of healthy babies, number of babies born in an area (SALEM).
- The number of healthy babies born is very less in the month of February and gradually increases and decreases throughout the year.
- The number of healthy babies born is very high

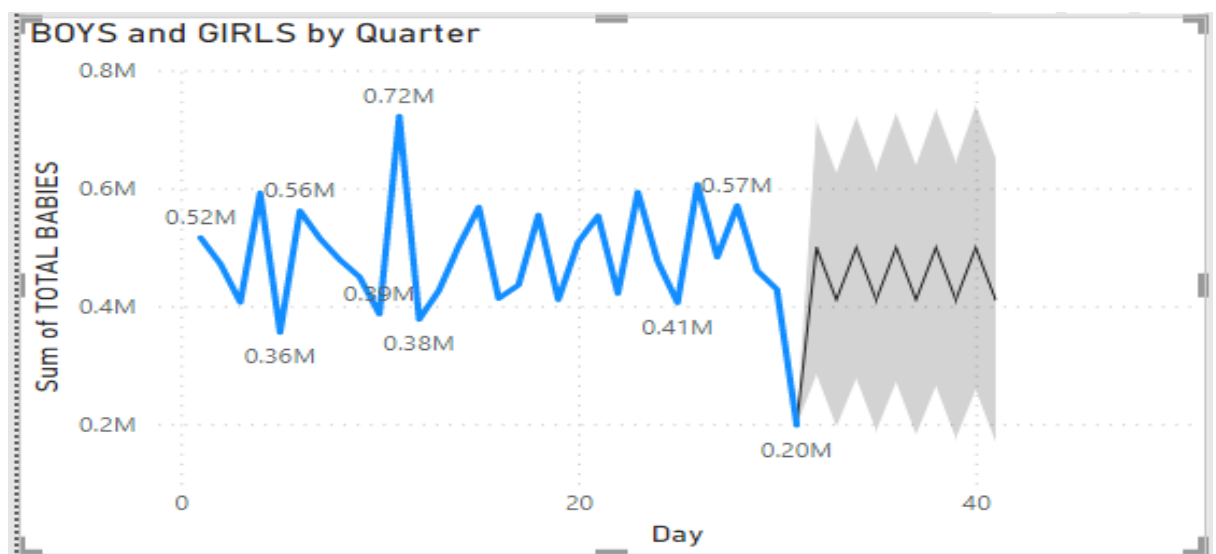


FIG:4.10 BOYS AND GIRLS BY QUARTER

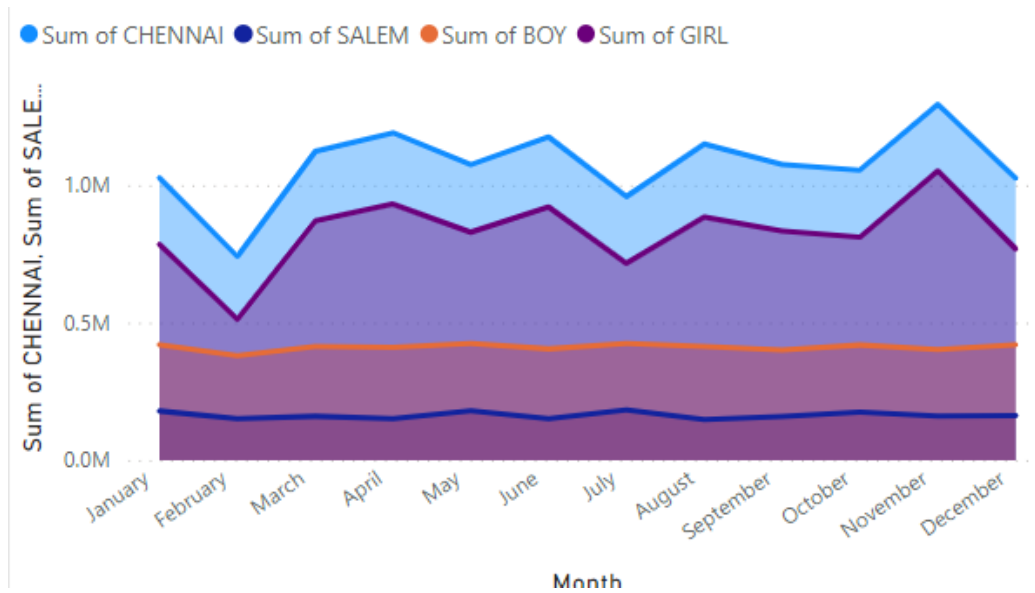


FIG:4.11 HEALTHY BABIES BY DISTRICT

- This graph shows birth of babies in a particular
- Here X axis represents number of months
- Here Y axis represents birth of babies in a particular area (Chennai, Salem).
- The number of total babies born is highest in Chennai in the month of November and December.
- The number of total number of babies born in Chennai in the month of February is lowest.
- This chart can be used to identify a number of births in a particular area which can be used to analyze birth rate and population rate.

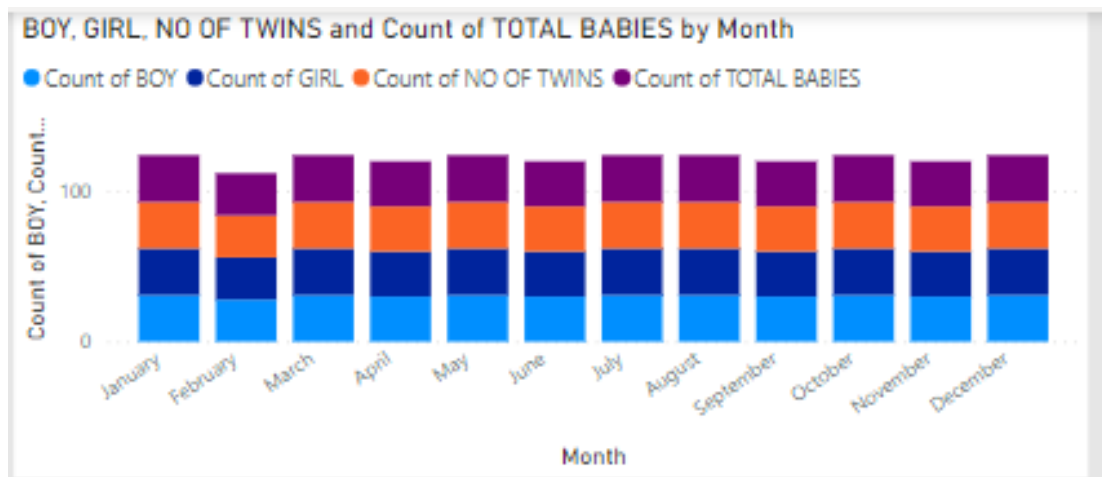


FIG:4.12 TOTAL NUMBER OF BABIES

- This is a forecasting chart
- X axis represents days and Y axis represents sum of total number of babies born throughout the year
- This chart predicts the number of babies born for the next 10 days of the next month.

CHAPTER 5

RESULT & DISCUSSION

The performance of the Prediction is mostly focused on Prediction accuracy, Accuracy in each table and confusion matrix which shows the number of predictions of each table which can be compared to the instances of each table. From the data visualization it was observed that the month of July had the highest Sum of BOY and was 11.90% higher than February, which had the lowest Sum of BOY at 379884. July accounted for 8.62% of Sum of BOY. Sum of GIRL and Sum of BOY diverged the most when the Month was November, when Sum of GIRL were 649245 higher than Sum of BOY. Across all 12 Month, Sum of BOY ranged from 379884 to 425095 and Sum of GIRL ranged from 512770 to 1051921.

5.1 APPENDIX

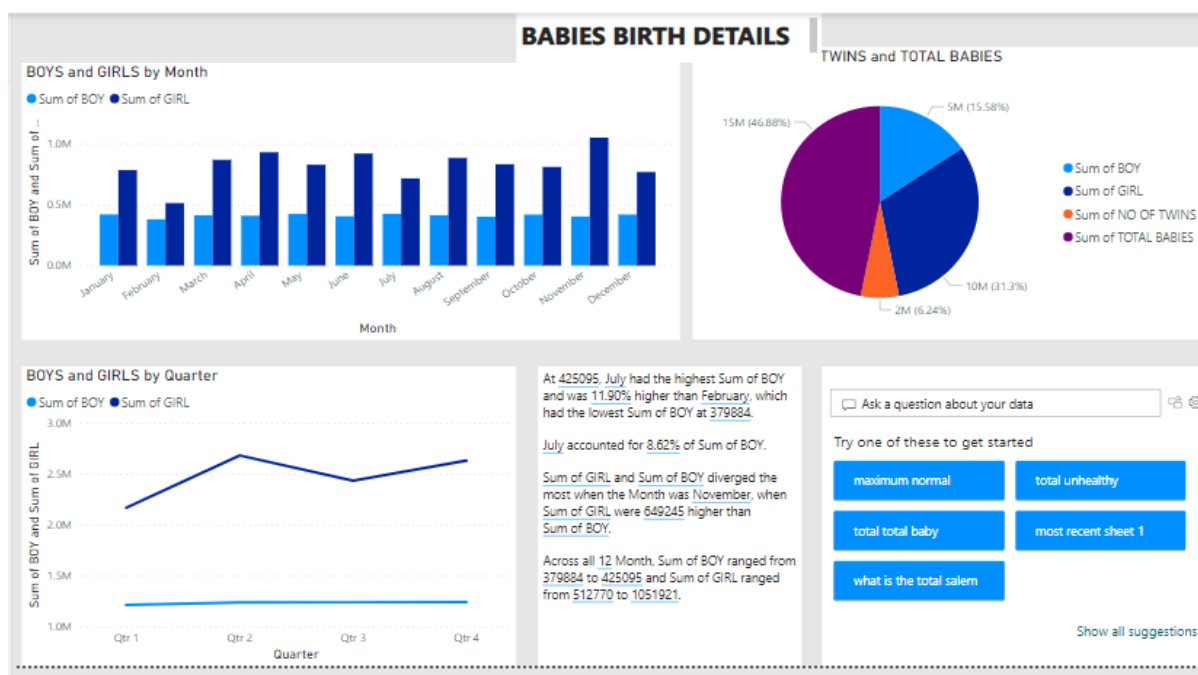


FIG 5.2.1 LINE CHART AND BAR CHART

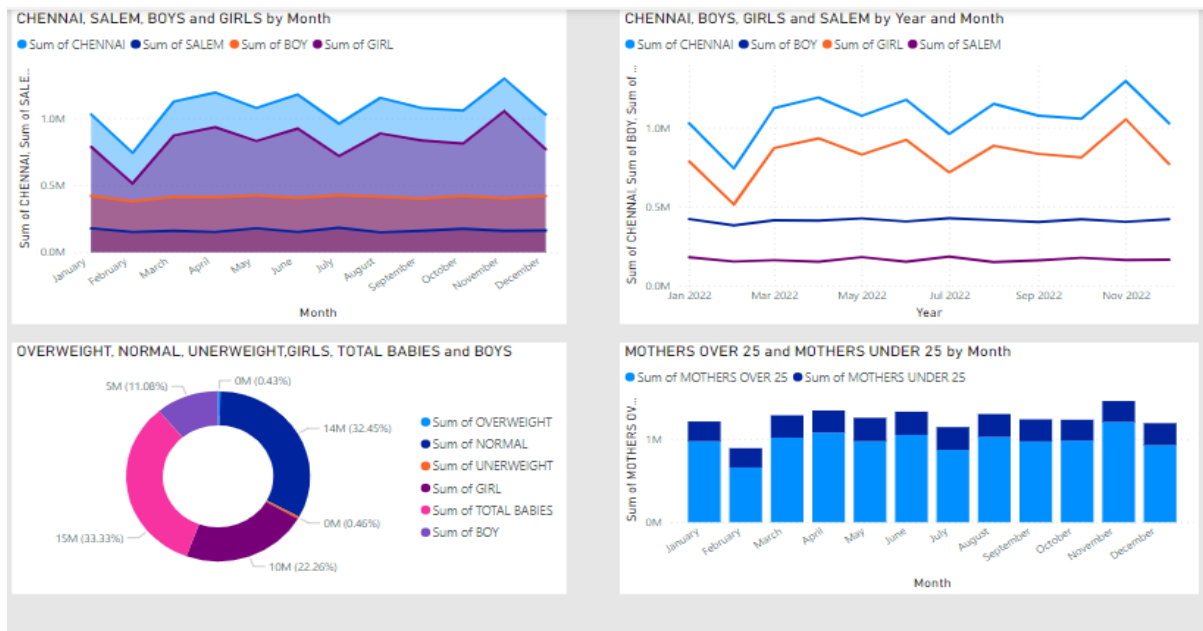


FIG 5.2.2 DONUT CHART AND BAR CHART

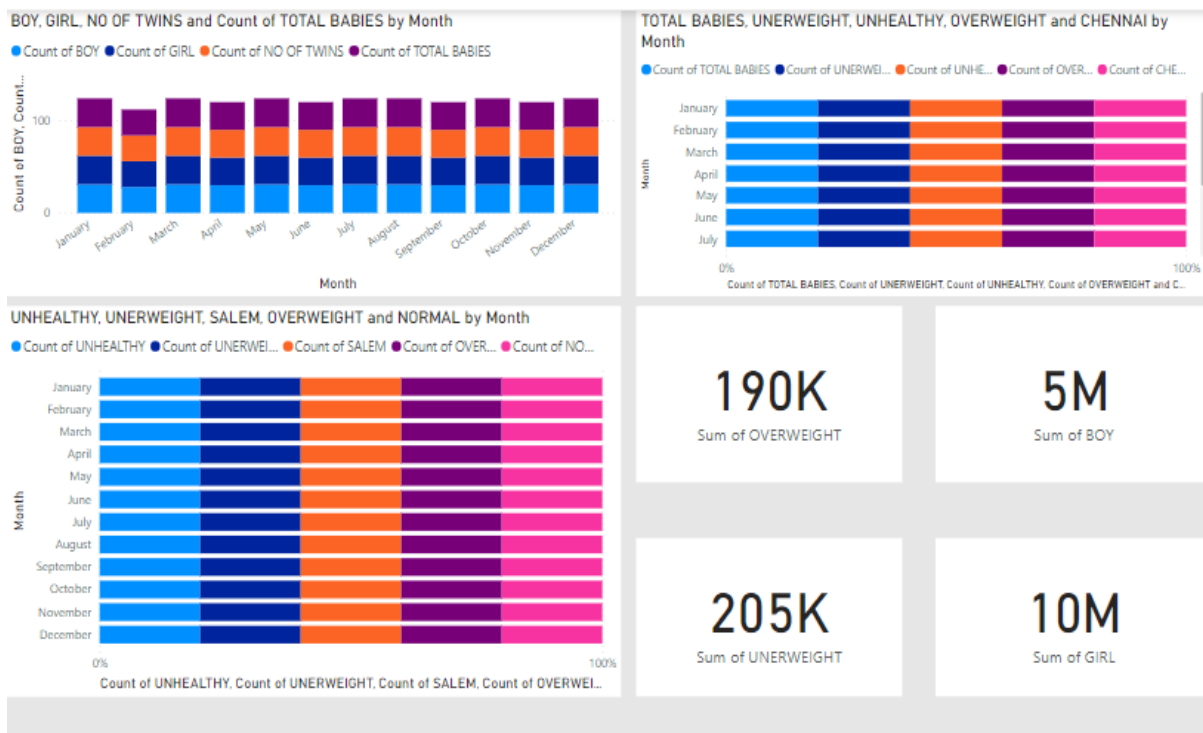


FIG 5.2.3 BAR CHART

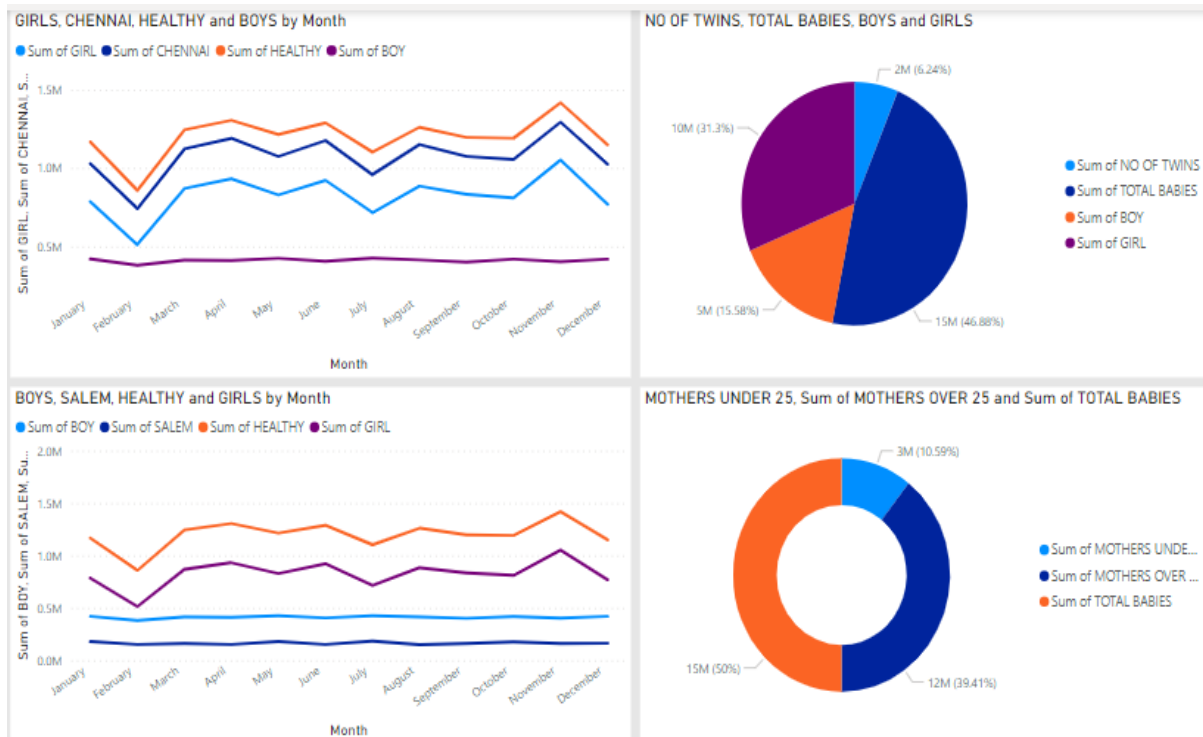


FIG 5.2.4 LINE CHART AND PIE CHART

CHAPTER 6

SUMMARY & CONCLUSION

CONCLUSION

The conclusion of a birth rate prediction model will depend on the specific model and data used. Generally, the goal of a birth rate prediction model is to provide insight into future trends in fertility rates, and to enable organizations and policymakers to plan for future resource needs and make informed decisions.

The effectiveness of a birth rate prediction model will depend on a variety of factors, including the accuracy of the underlying data, the assumptions made about future trends, and the complexity of the model itself. Predicting birth rates can be a useful tool for organizations and policymakers, but it is important to be aware of the limitations and potential drawbacks of any predictive model.

In summary, birth rate prediction models can provide valuable insights into future demographic and societal trends, and can be used to inform policy decisions and resource allocation. However, it is important to approach any prediction with caution and to consider the potential limitations and uncertainties involved.

6.2 FUTURE WORKS

For future works as the birth rate prediction models rely on accurate demographic data, so efforts to improve data collection and quality could lead to more accurate predictions.

As social norms and cultural attitudes towards marriage, family, and childbearing change, birth rate prediction models may need to be updated to reflect these changes. Birth rate prediction models could be developed for specific regions or localities to better understand variations in fertility rates across different populations.

REFERENCES

- i. Bavestrello, Giorgio; Sommer, Christian; Sarà, Michele (1992). "Bi-directional conversion in *Turritopsis nutricula* (Hydrozoa)". *Scientia Marina*. 56 (2–3): 137–140.
- ii. sexes (years) column". United Nations Department of Economic and Social Affairs, Population Division. 2022.
- iii. Wang G, Gunasekaran A, Ngai EWT, Papadopoulos T. Big data analytics in logistics and supply chain management: certain investigations for research and applications. *Int J Prod Econ*. 2016; 176:98–110
- iv. "Forecasting Fertility in Developing Countries: The Case of India" by David E. Bloom and Jeffrey G. Williamson. This paper examines various methods for predicting fertility rates in developing countries, with a focus on India.

- v. "A Review of Demographic Models for Population Projections" by John R. Wilmoth. This paper provides an overview of the different demographic models used for population projections, including models for predicting birth rates.
- vi. "Estimating Fertility from Birth Histories: A Reinterpretation of Demographic History" by John Bogart. This paper discusses the use of birth histories to estimate fertility rates, and how this method has been used in various countries
- vii. **<https://ieeexplore.ieee.org/document/9777597>**
- viii. **<https://www.researchgate.net/publication/330344789> Birth Rate and Death Rate Visualization and Prediction of all Indian States<https://www.hindawi.com/journals/jmath/2021/7725125/>**