

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



राष्ट्रीय लघु उद्योग निगम लिमिटेड

NATIONAL SMALL INDUSTRIES CORPORATION LIMITED

(A Govt. of India Enterprise)

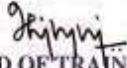
NSIC - TECHNICAL SERVICES CENTRE
Sector B-24, Guindy Industrial Estate, Ekkaduthangal, Chennai - 600 032.

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.



GOVT. OF INDIA
ENTERPRISE



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

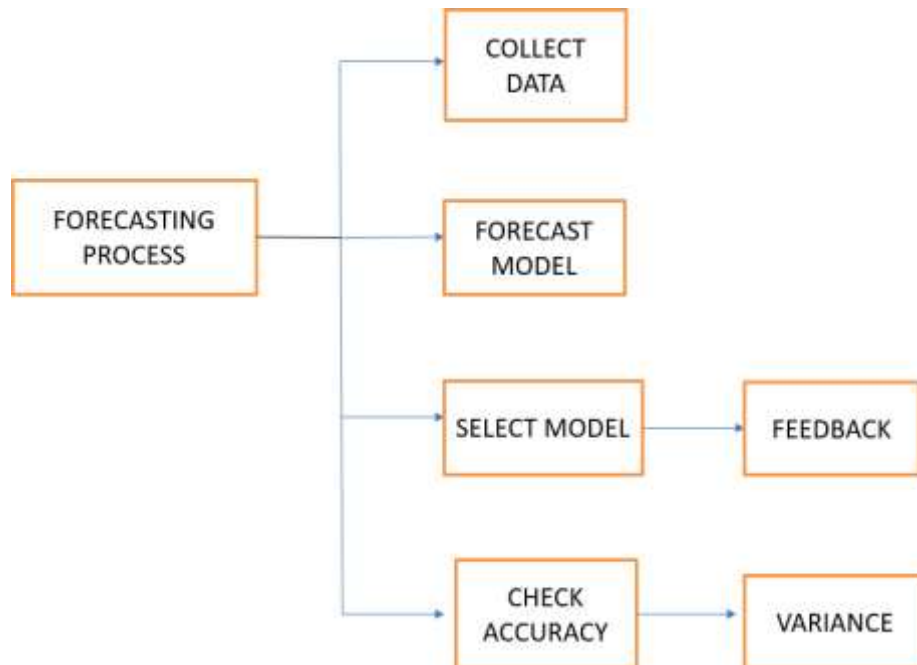
1.3 BIRTH RATE FORECASTING

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:

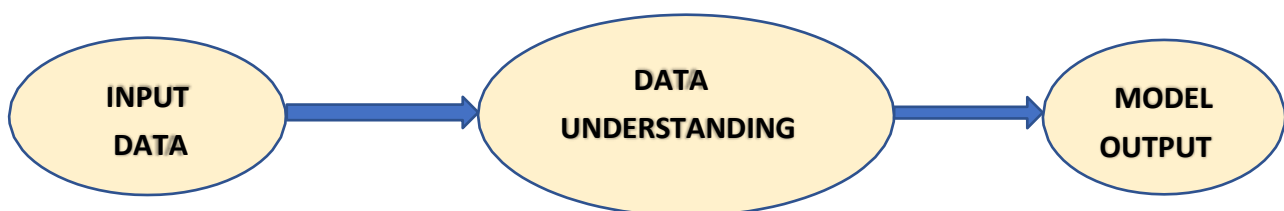


FIG 1.2 BLOCK DIAGRAM

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 Rimón 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.

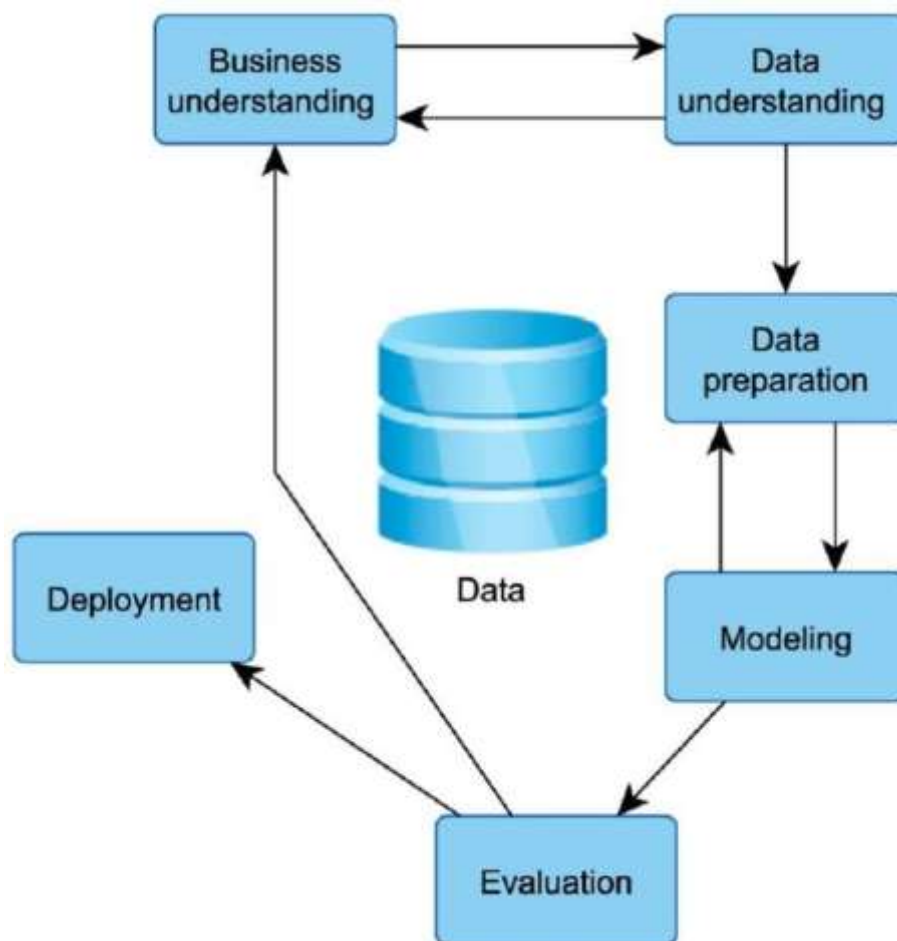


Fig:4.1 Project Development

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:

A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S
1	DATES	OVERWEIGHT	UNDERWEIGHT	NORMAL	TOTAL BAKES	SECTION UNHEALTHY	HEALTHY	MOTHERS UNDER 25	MOTHERS OVER 25	BOY	GIRL	NO OF PAIRS SALEM	CHITANA					
2	01-01-2022	954	494	32561	34008	2427	1254	32755	5132	27429	13949	20080	8131	3080	30044			
3	02-01-2022	129	532	14986	25247	7637	1434	23811	6162	18724	12385	12857	7759	4361	30955			
4	03-01-2022	389	262	18088	16737	4176	1262	15456	5833	10176	12542	4175	2989	9518	7198			
5	04-01-2022	681	910	16352	17913	1821	1550	18064	6894	11019	12537	5176	8614	7751	38182			
6	05-01-2022	127	894	23452	24473	6570	1135	23338	5131	18113	13553	10621	7218	6064	17509			
7	06-01-2022	233	371	23342	21899	2355	1319	21521	9158	13618	13668	9238	4811	7934	13861			
8	07-01-2022	434	258	23412	24121	3162	1336	22789	7782	18343	14632	9521	8031	8135	13900			
9	08-01-2022	338	781	34215	35231	4387	1103	34134	7314	18031	12223	21031	5691	6250	18988			
10	09-01-2022	343	224	33452	34023	3118	1233	32784	1238	12701	14883	7003	4623	9189	34831			
11	10-01-2022	320	328	33421	33769	3651	1113	33638	8417	17132	13764	13005	6664	8886	17401			
12	11-01-2022	217	437	38124	38878	9508	1137	37841	9535	30768	14099	8479	4902	1995	37011			
13	12-01-2022	793	395	31255	24697	1271	1416	21111	7962	16645	13826	10781	5538	1389	11138			
14	13-01-2022	404	862	15462	16828	2842	1483	13347	8624	12053	14667	1381	8294	5087	11741			
15	14-01-2022	844	674	27857	29475	9673	1273	36302	9681	19784	13623	15553	3886	7940	21516			
16	15-01-2022	603	881	34342	25642	5236	1269	24373	7138	18056	12667	12873	1114	8530	17112			
17	16-01-2022	973	136	19461	20571	8078	1574	19135	6275	12196	13844	6602	3942	1881	18848			
18	17-01-2022	942	275	25752	26989	1446	1226	25743	7426	10543	14431	12558	8705	5143	21826			
19	18-01-2022	750	436	34317	36481	2783	1165	34128	8753	36743	12084	83399	1263	3063	42484			
20	19-01-2022	581	752	23887	25249	1644	1478	23762	7373	17867	13482	11838	8125	7427	57813			
21	20-01-2022	124	473	37635	38155	1189	1344	36601	9882	37773	13780	84961	2674	2167	65168			
22	21-01-2022	284	882	27830	29005	1984	1413	27502	8834	10173	14852	14533	8789	2881	20024			
23	22-01-2022	280	814	28172	29486	3298	1333	28172	8187	71158	13662	65826	5795	1342	76144			
24	23-01-2022	340	317	38276	38843	8361	1368	37575	7532	11411	14783	24180	7552	9889	29024			
25	24-01-2022	184	511	17347	38514	6616	1222	37192	8254	30360	12840	15574	8419	4405	31989			
26	25-01-2022	425	254	18873	20582	1618	1534	19238	7851	12713	13829	6653	2568	3952	15030			
27	26-01-2022	251	451	38076	29140	3391	1465	27655	8546	30544	13382	16748	5297	4481	24749			
28	27-01-2022	511	586	17367	18444	2074	1008	17456	7521	10943	12583	5471	3131	9252	9212			
29	28-01-2022	223	521	17428	28372	8156	1148	27211	7957	20453	12271	16202	3455	8800	17542			

FIG: 4.2 EXCEL DATA

project final data - Excel											Matrix Regression										
File Home Insert Page Layout Formulas Data Review View Help Tell me what you want to do.																					
Paste											Clipboard										
Format Painter											Font										
Font											Paragraph										
Text											Alignment										
Number											Styles										
Cells											Editing										
163	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	
164	20352	26880	3776	1370	25824	8305	18616	16732	12252	8339	5168	11879									
165	13434	24234	4335	1342	38272	9399	20585	14001	10233	5061	4884	29750									
166	85433	88728	5732	1229	85544	8786	70062	13883	73177	2563	4319	82209									
167	25438	26745	2786	1527	25828	8832	17813	13044	12701	8075	7214	37631									
168	31252	23887	4385	1246	21641	9845	14043	12943	6647	3180	3049	28838									
169	43176	44349	8564	1336	42893	9882	36367	13628	31221	5005	8549	35581									
170	33031	24477	5637	1280	23187	9726	34753	12559	11338	9300	1368	21100									
171	31154	32885	3423	1064	31821	9386	23481	13079	19806	9761	7397	25498									
172	82212	63832	7056	1157	81723	9857	75985	14589	68241	3378	5687	82145									
173	10374	25075	1458	1057	26058	9458	25657	16671	11406	2340	4857	26219									
174	42314	45726	8423	1325	44133	8608	38672	13877	31405	3688	5757	22541									
175	34201	35605	4851	1347	33758	9672	25714	13886	21251	4359	3697	32188									
176	87987	89103	8852	1286	67927	9421	70772	12483	36780	1952	2772	85421									
177	23738	24582	1544	1438	23144	8769	15613	14954	5668	9186	3535	22549									
178	83001	34413	4271	1020	33383	9362	25073	13790	20671	5551	1382	32321									
179	33831	24792	3693	1301	23881	9967	14825	13038	12754	4356	9839	14953									
180	94832	68310	8746	1242	64888	8256	57854	24582	51526	9587	3272	62838									
181	31638	32725	2573	1481	31344	8584	24141	15532	19174	2586	2811	29912									
182	52181	52907	5527	1381	53526	9335	43572	12144	40773	3020	3440	49467									
183	31056	32352	3776	1381	31121	9495	23887	13880	19145	1989	8291	26329									
184	22133	22776	3322	1295	23522	9383	33419	12794	95833	7321	8150	14590									
185	18512	23802	3528	1345	18137	8980	10323	14675	4327	8521	8338	10967									
186	23127	34832	4076	1388	33494	9254	26038	13635	21277	1177	3421	21471									
187	21212	22198	9963	1440	30780	8574	13616	14459	7731	1864	2563	38629									
188	83133	83994	2967	1054	85040	9175	48833	12837	73337	5835	2382	82712									
189	26423	36828	7728	1038	25780	9422	17498	13136	13712	6617	3474	23264									
190	31513	32856	2757	1335	33223	8341	24325	14874	17782	5513	4444	28212									
191	24312	24836	1867	1055	23779	8783	16852	12512	11322	5328	8765	36068									
Sheet1 Sheet2 Sheet3																					

	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W
162	20245	20917	5899	1388	29553	8973	21996	12733	18654	1143	9781	21136								
163	22434	23826	6388	1233	22432	9329	14297	14087	9339	8474	6042	17586								
164	26752	26996	3738	1133	25624	8255	18618	14742	12352	8339	3165	21829								
165	19434	54216	4315	1342	52872	9789	24505	14051	20212	5087	4494	29750								
166	85423	86776	5732	1278	85544	9789	26962	13651	23177	2562	4519	82256								
167	29438	26745	3296	1227	25658	8832	17913	13844	13781	8025	7214	19731								
168	21352	22887	4585	1245	21645	8845	14042	12943	9447	3185	3046	29838								
169	43378	44149	5954	1159	42993	9882	34287	13028	21121	5005	8565	30084								
170	22243	24477	5627	1280	22197	8726	14755	13559	13838	9400	1368	24128								
171	11394	10985	3423	1064	31821	9394	23492	13079	19886	9787	7397	25488								
172	81311	83632	7008	1117	81725	9842	72865	14589	68241	1578	1687	81145								
173	23214	25075	3489	1057	24958	9418	19657	13671	21494	2548	4857	20218								
174	44214	45276	8423	1123	44313	8686	36632	13877	21421	3688	8737	20541								
175	34855	35985	4851	1127	33758	9872	25313	13889	21201	4155	3897	31188								
176	87867	88192	5812	1284	87827	9421	20772	13453	26780	1851	1772	85421								
177	23718	24587	1244	1439	23144	8789	15811	14954	9888	9186	3533	20349								
178	33385	34413	4271	1030	33381	9362	25051	13796	20617	2752	3183	31231								
179	13853	24782	5485	1281	23891	9967	14925	13958	17754	6256	8816	59918								
180	44621	66110	8746	1242	64868	8256	57854	14582	51528	9187	1272	63838								
181	15108	13725	2573	1481	31244	8584	24143	13552	19171	2586	2814	29912								
182	52183	52807	5527	1281	51526	9335	42572	12334	40773	5020	3440	49407								
183	11098	12302	1776	1341	31121	9495	22807	13940	15243	1989	4291	24389								
184	22111	22770	1727	1261	21525	9187	13419	12794	9883	7322	8190	14588								
185	18812	19302	8558	1345	18157	8980	10522	14875	4377	4513	8318	10967								
186	33123	34892	4076	1388	33484	8294	26588	13825	21277	1177	3421	31471								
187	21312	22181	8983	1442	20750	8534	13638	14489	7731	1884	2541	28679								
188	83121	83884	3982	1254	82940	9175	24818	13817	21137	5835	2282	81712								
189	26423	26826	7738	1538	25780	9422	17486	13116	13712	4417	3878	33564								
190	31312	32226	2727	1332	31322	8341	24215	14828	17782	5512	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	30543	37746	4887	1209	36540	8145	27865	12789	24877	8636	1918	84139								
338	22625	24291	7995	1393	22721	8227	15964	13795	10381	7366	9440	14821								
339	47632	68291	1178	1436	66867	9159	29134	14482	54881	8832	8278	49323								
340	22817	23622	4934	1454	22238	7259	18263	13348	10274	9871	1383	20239								
341	18948	18904	7327	1828	17376	8815	24589	12362	21942	2444	2698	25706								
342	85048	87095	1280	1003	86092	7886	79329	14842	72253	7593	6103	80992								
343	30642	28410	5480	1093	25157	9552	16818	14650	11760	8108	2525	23890								
344	12534	13889	5889	1080	32549	8229	25440	12189	21480	1018	7512	20357								
345	17734	28231	4477	1384	26867	7614	30617	14854	13377	2027	7772	20459								
346	54283	55493	8323	1220	54273	8855	46518	14553	40030	9412	5785	45708								
347	13245	25148	8443	1050	34888	8105	17043	14849	10394	2751	3613	19526								
348	22378	22942	4877	1113	21829	8825	19127	13254	9888	8896	8528	29418								
349	17134	18992	1889	1274	31218	7155	36257	13844	10148	8064	2625	25867								
350	63214	64020	7860	1034	62888	8736	55384	14299	49771	7968	3141	60879								
351	63245	64236	1126	1289	62947	8319	55017	13893	90343	8025	7287	58949								
352	34352	35385	7020	1240	34345	9713	25674	13584	21821	6403	4757	30618								
353	25438	26466	5712	1199	25476	8734	18912	12511	14555	1591	8622	17044								
354	12988	23964	2082	1401	13663	8457	12567	12883	8131	8091	2071	17991								
355	13456	24383	3348	1344	23659	9528	14855	12789	13864	4384	1401	27980								
356	84512	87957	8313	1411	84548	8388	77789	14845	71132	2383	3715	82342								
357	34543	35948	4482	1294	33742	9723	23329	14574	30474	1783	9298	25750								
358	53456	54316	7025	1032	53294	8277	46029	12232	43084	7003	1347	52868								
359	24326	25041	9434	1032	24803	8729	16513	14521	10821	1479	9419	25426								
360	26642	27302	8172	1305	25897	8826	18876	14348	12954	1364	5255	22047								
361	26643	27239	8143	1159	26681	8411	18848	14511	12728	3791	5819	25380								
362	34528	35211	8627	1175	34836	7888	27375	13272	21833	7055	1004	34207								
363	44532	46286	8677	1136	45150	8517	36769	14799	81577	8388	4475	89611								
364	24632	25600	1242	1074	24588	8794	18995	13025	13831	5381	7201	28409								
365	35663	37169	5439	1383	35886	7148	29723	14254	22923	7278	3612	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

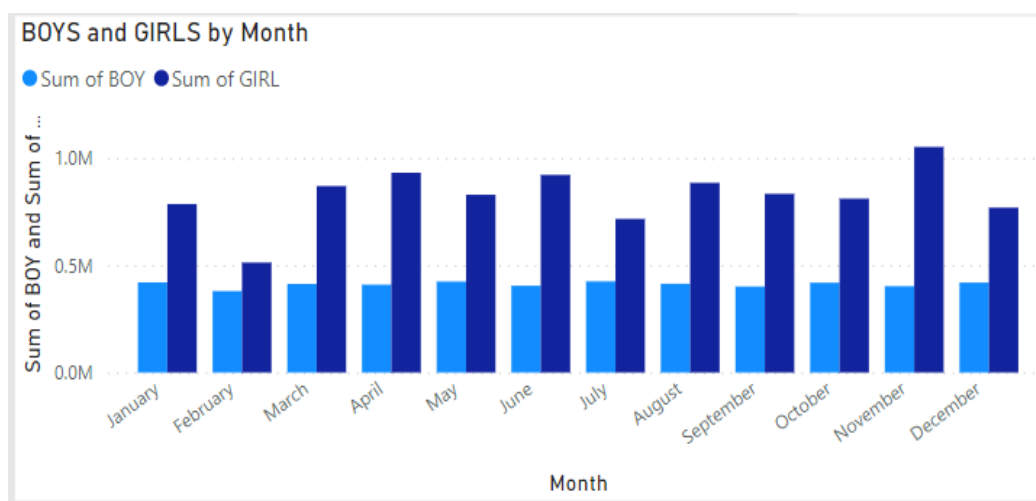


FIG: 4.6 TOTAL NUMBER OF BIRTH BY MONTH

- . 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.

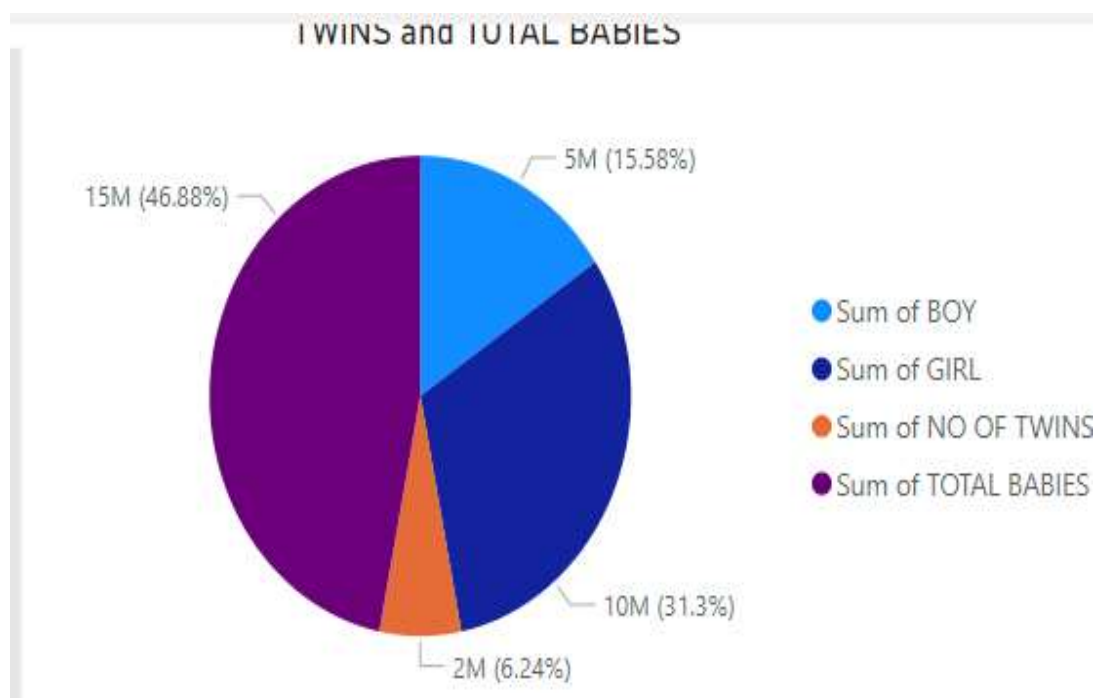


Fig:4.7 TOTAL NUMBER OF TWINS

- 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.

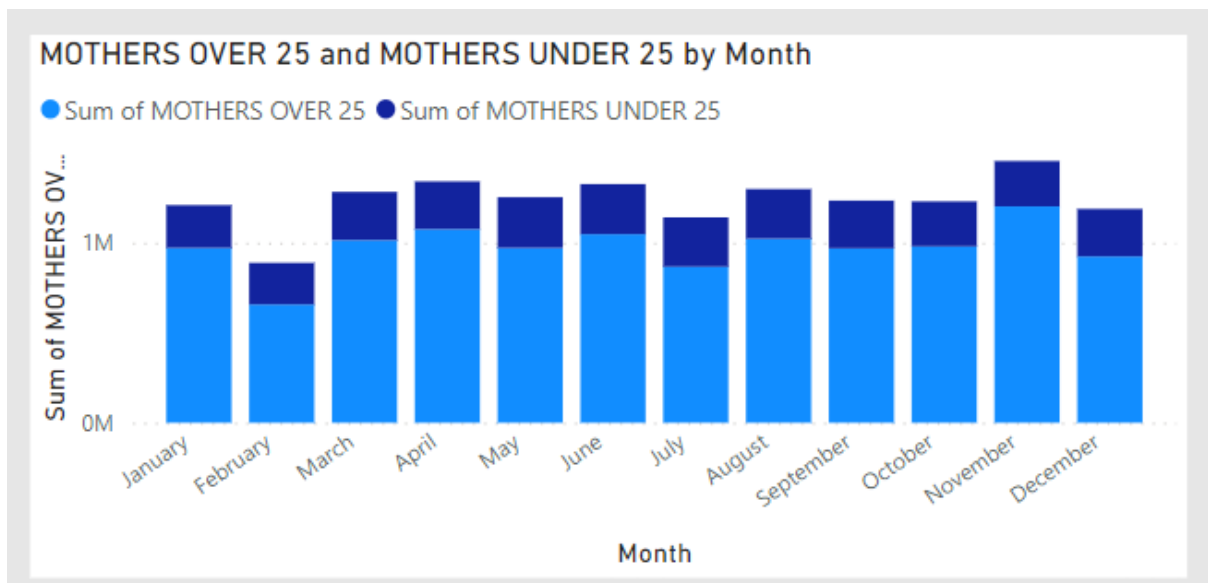


FIG:4.8 AGE OF MOTHERS

- 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.

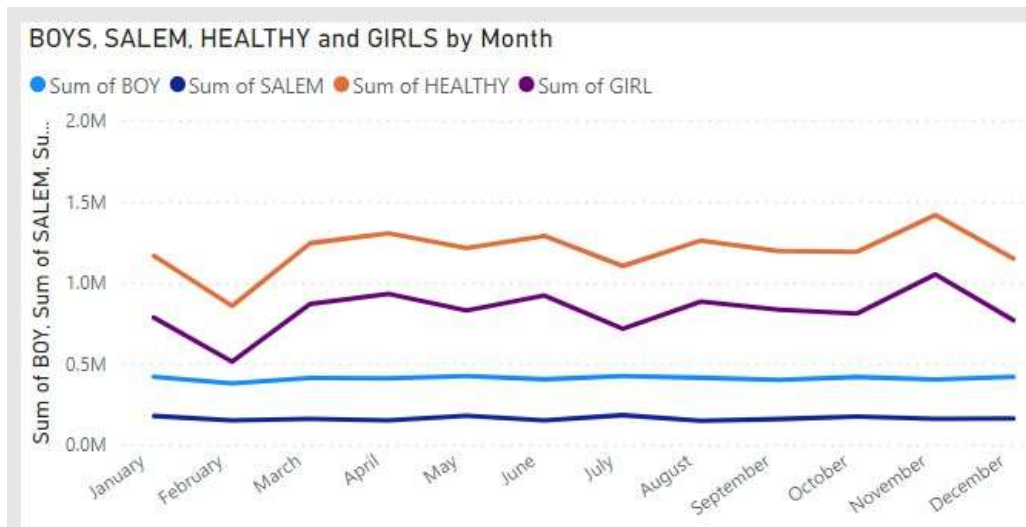


FIG :4.9 HEALTHY BABIES BY DISTRICT

- 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

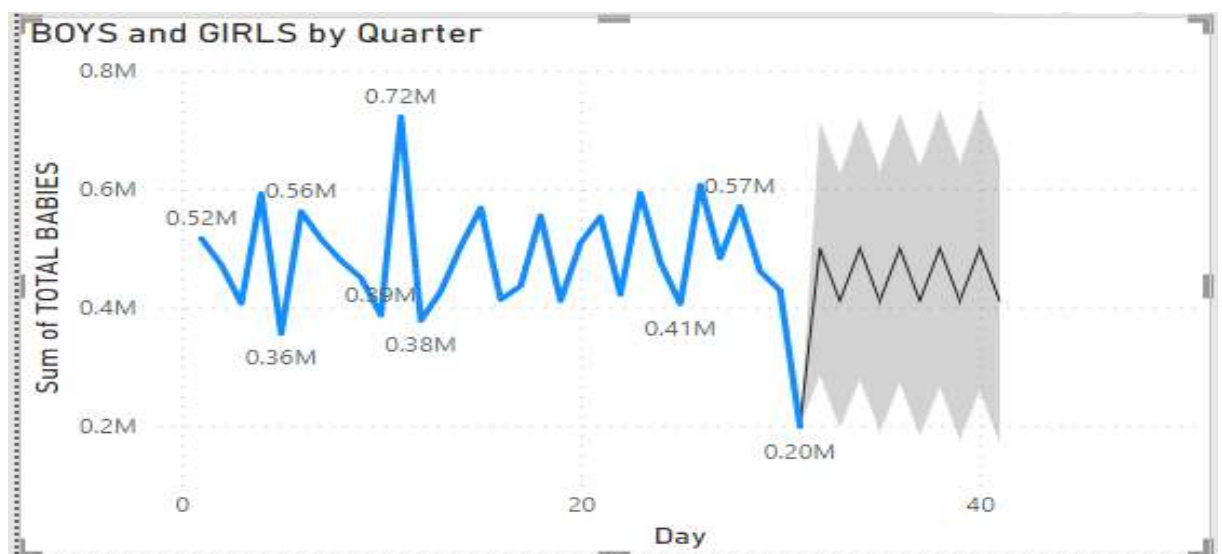


FIG:4.10 BOYS AND GIRLS BY QUARTER

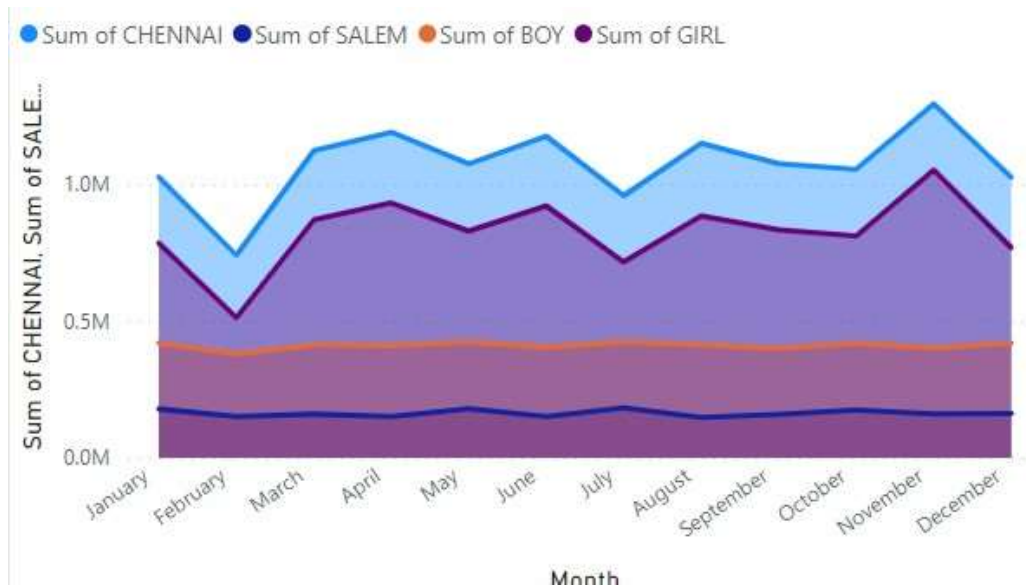


FIG:4.11 HEALTHY BABIES BY DISTRICT

- 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.

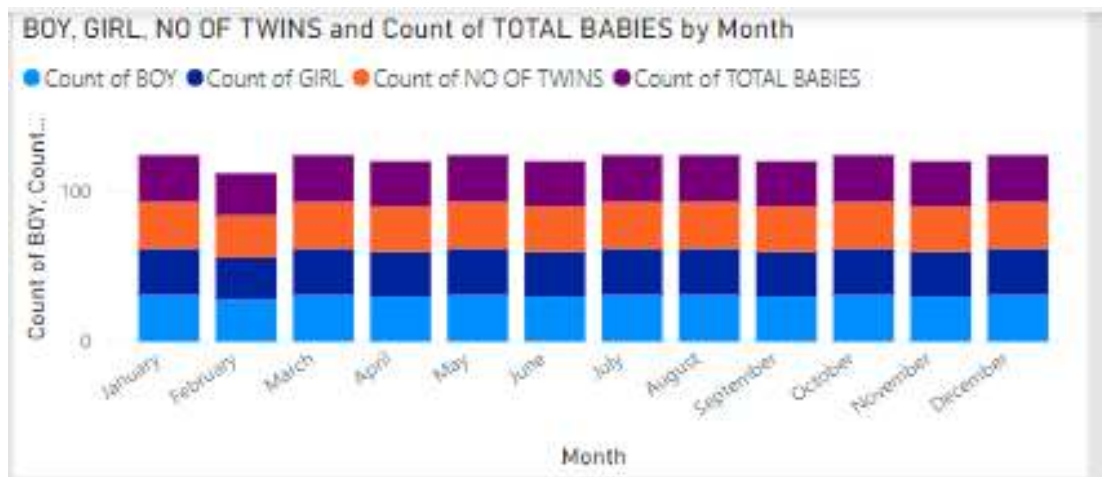


FIG:4.12 TOTAL NUMBER OF BABIES

- 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

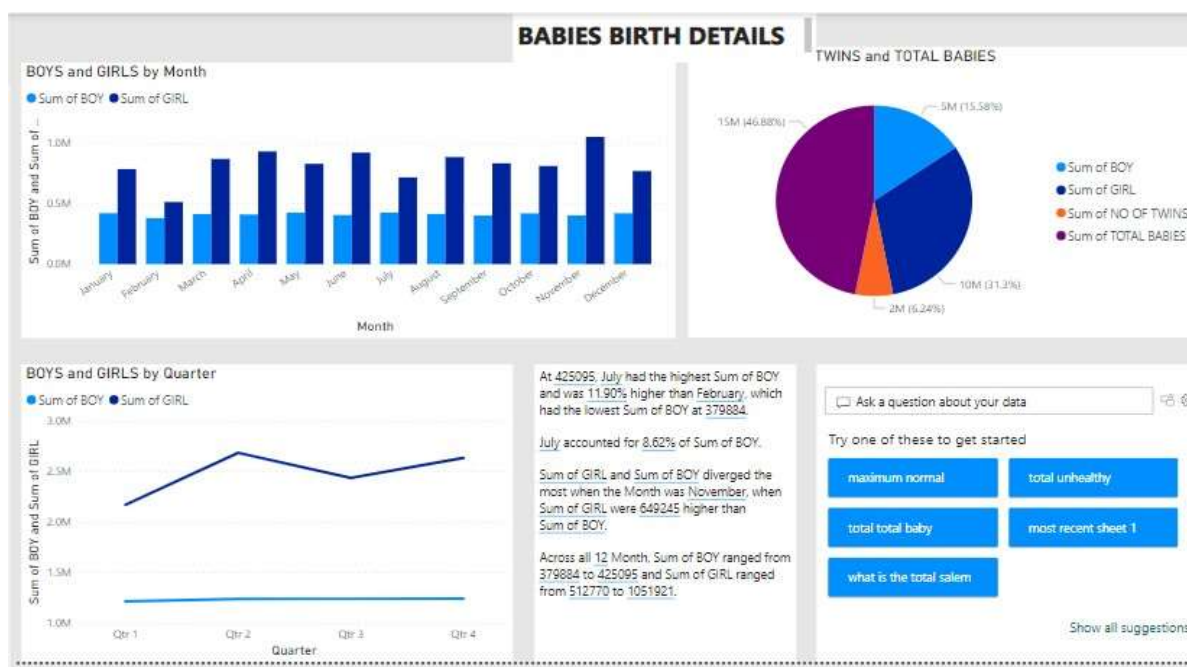


FIG 5.2.1 LINE CHART AND BAR CHART

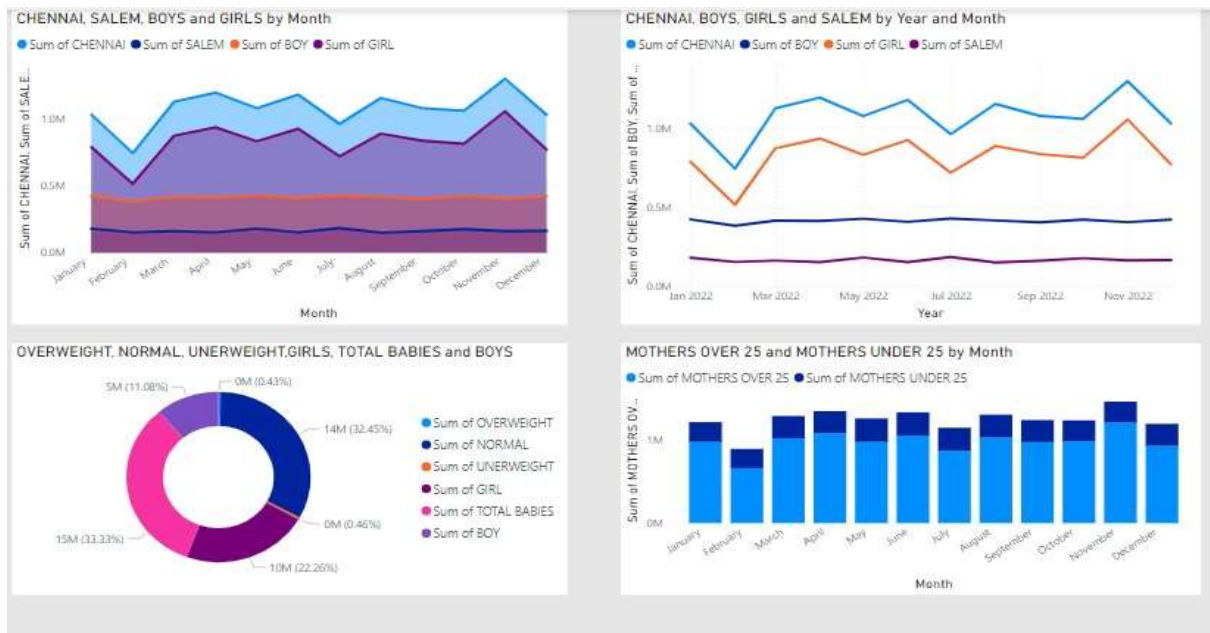


FIG 5.2.2 DONUT CHART AND BAR CHART

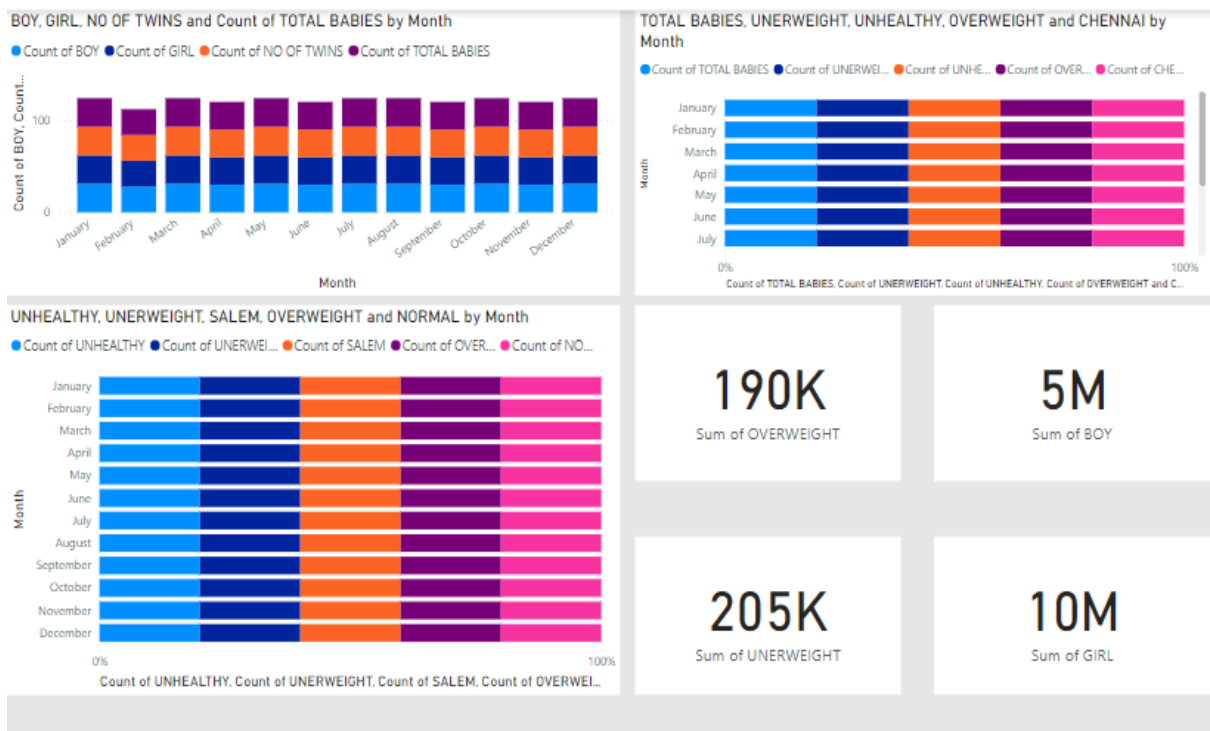


FIG 5.2.3 BAR CHART

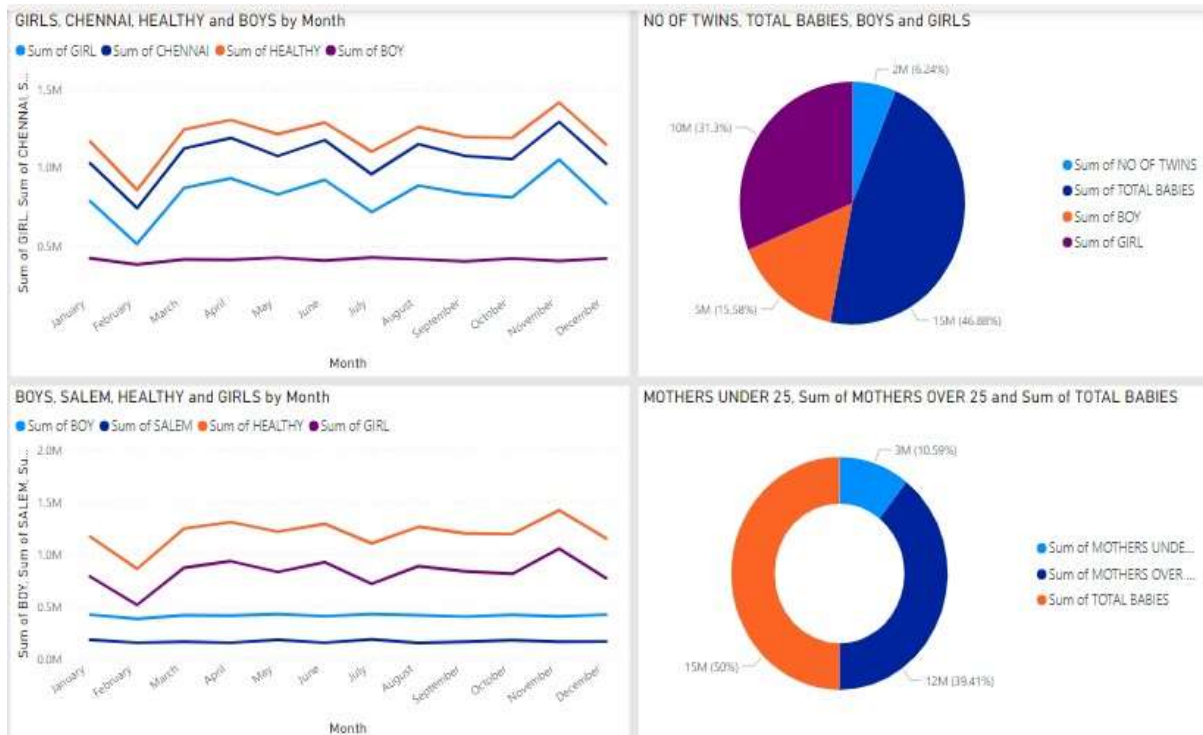


FIG 5.2.4 LINE CHART AND PIE CHART

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.researchgate.net/publication/330344789_Birth_Rate_and_Death_Rate_Visualization_and_Prediction_of_all_Indian_States)<https://www.hindawi.com/journals/jmath/2021/7725125/>