

Statistics and data essay sample



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Statistics is the study of the collection, organization, analysis, interpretation and presentation of data. It deals with all aspects of this, including the planning of data collection in terms of the design of surveys and experiments.

A statistician is someone who is particularly well-versed in the ways of thinking necessary for the successful application of statistical analysis. Such people have often gained experience through working in any of a wide number of fields.

Some consider statistics to be a mathematical body of science pertaining to the collection, analysis, interpretation or explanation, and presentation of data, while others consider it a branch of mathematics concerned with collecting and interpreting data. Because of its empirical roots and its focus on applications, statistics is usually considered to be a distinct mathematical science rather than a branch of mathematics. Much of statistics is non-mathematical: ensuring that data collection is undertaken in a way that allows valid conclusions to be drawn; coding and archiving of data so that information is retained

Statisticians improve the quality of data by coming up with a specific design of experiments and survey sampling. Statistics itself also provides tools for prediction and forecasting the use of data and statistical models. Statistics is applicable to a wide variety of academic disciplines, including natural and social sciences, government, and business. Statistical consultants are available to provide help for organizations and companies without direct access to expertise relevant to their particular questions.

History of Statistics:

The use of statistical methods dates back at least to the 5th century BC. The earliest writing on statistics was found in a 9th century book entitled: “Manuscript on Deciphering Cryptographic Messages”, written by Al-Kindi. In his book, he gave a detailed description of how to use statistics and frequency analysis to decipher encrypted messages, this was the birth of both statistics and cryptanalysis, according to the Saudi engineer Ibrahim Al-Kadi

Importance of Statistics in our Life:

Statistics is a very effective tool, in which you look at past data from surveys or census or simply recorded data over a period of time. It is important because using stats you can view past data to help make business decisions or decisions within any workplace. You can do a statistical test to find out if a new idea or business decisions should be considered or rejected.

It is a systematic approach to investigations during which numerical data is collected and/or the researcher transforms what is collected or observed into numerical data. It often describes a situation or event, answering the ‘ what’ and ‘ how many’ questions you may have about something. This is research which involves measuring or counting attributes (i. e. quantities). A quantitative approach is often concerned with finding evidence to either support or contradict an idea or hypothesis you might have. A hypothesis is where a predicted answer to a research question is proposed

Once you have collected your data you need to make sense of the responses you have got back. Quantitative data analysis enables you to make sense of

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data by: * organising them

* summarising them

* doing exploratory analysis

And to communicate the meaning to others by presenting data as:

* tables

* graphical displays

* summary statistics

quantitative research methodology often allows researchers to identify a cause and effect relationship. Another advantage is that quantitative data reveal measurements that provide meaningful information about the subject(s) of study. The numbers and statistics used in quantitative research allow one to make inferences and evaluations about the subject(s) of study. Statistics is a branch of applied mathematics which includes the planning, summarizing, and interpreting of uncertain observations. Because the aim of statistics is to produce the “ best” information from available data, some authors make statistics a branch of decision theory. As a model of randomness or ignorance, probability theory plays a critical role in the development of statistical theory. We describe our knowledge (and ignorance) mathematically and attempt to learn more from whatever we can observe. This requires us to

1. Plan our observations to control their variability (experiment design),
2. Summarize a collection of observations to feature their commonality by suppressing details (descriptive statistics), and
3. Reach consensus about what the observations tell us about the world we observe (statistical inference).

In some forms of descriptive statistics, notably data mining, the second and third of these steps become so prominent that the first step (planning) appears to become less important. In these disciplines, data often are collected outside the control of the person doing the analysis, and the result of the analysis may be more an operational model than a consensus report about the world. The probability of an event is often defined as a number between one and zero rather than a percentage. In reality however there is virtually nothing that has a probability of 1 or 0. You could say that the sun will certainly rise in the morning, but what if an extremely unlikely event destroys the sun? What if there is a nuclear war and the sky is covered in ash and smoke? We often round the probability of such things up or down because they are so likely or unlikely to occur, that it's easier to recognize them as a probability of one or zero.

However, this can often lead to misunderstandings and dangerous behavior, because people are unable to distinguish between, e. g., a probability of 10^{-4} and a probability of 10^{-9} , despite the very practical difference between them. If you expect to cross the road about 105 or 106 times in your life, then reducing your risk per road crossing to 10^{-9} will make you safe for your whole life, while a risk per road crossing of 10^{-4} will make it very likely that you will have an accident, despite the intuitive feeling that 0.01% is a very small risk. Some sciences use applied statistics so extensively that they have specialized terminology. These disciplines include:

Biostatistics

Business statistics

Economic statistics

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Engineering statistics

Population statistics

Psychological statistics

Social statistics (for all the social sciences)

Process analysis and Chemometrics (for analysis of data from analytical chemistry and chemical engineering)

Statistics form a key basis tool in business and manufacturing as well. It is used to understand measurement systems variability, control processes (as in “ statistical process control” or SPC), for summarizing data, and to make data-driven decisions. In these roles it is a key tool, and perhaps the only reliable tool.

For a broader study, involving a greater number of subjects, and enhancing the generalisation of the results can allow for greater objectivity and accuracy of results. Generally, quantitative methods are designed to provide summaries of data that support generalisations about the phenomenon under study. In order to accomplish this, quantitative research usually involves few variables and many cases, and employs prescribed procedures to ensure validity and reliability Using standards means that the research can be replicated, and then analysed and compared with similar studies. Kruger (2003) confirms that ‘ quantitative methods allow us to summarize vast sources of information and facilitate comparisons across categories and over time

Practical Application of Statistics:

Quantitative methods are ideally suited for finding out who, what, when and

where. The thing that I have learn from Quantitative Method is that it is really useful in our daily life. We can first apply the Sinking Fund in our bank account, it would help us to find out the money that we had deposit into the bank and calculate the future value of the money we will have in account. So we could actually predict what we could afford in the mean time and in the future.

Amortization, this is also very useful is because of its will eventually relate to our daily life. For example, the car we bought, we would have this large amount of money to buy the car by cash, so we would not have borrow the money from the bank. The bank will come out with a series of payment that you have to pay in the particular time given every month. To ensure that the bank did not have any mistake, we own self could calculate or predict the amount that we have to pay.

Applications of statistics in daily life Statistics is the collection of data and its representation or interpretation. Statistics use three means of comparison through the data mean, median & mode. Practical application of these three are as follows: * It helps teachers to see the average marks of the students. * It is used in factories, for the Mean authorities to recognize whether the benefits of the workers is continued or not. * It is also used to contrast the salaries of the workers. To calculate the average speed of anything. * It is also used by the government to find the income or expenses of any person. * Using this the family could balance their expenses with their average income. * It is used to measure the distribution of the earnings Used to find the players height e. g. football players.

- * To find the middle age from the class students. Also used to find the poverty line.
- * It is used to influx of the public transport.
- * The no. of games succeeded by any team of players.
- * The frequency of the need of infants.
- * Used to find the number of the mode is also seen in calculation of the wages.
- * in the patients going to the hospitals, the mode of travel etc. * Product marketing
- * Clothing sizes
- * Average income
- * Gambling
- * Car repair
- * Climate figures
- * Game shows
- * Airplane crash figures
- * Product testing and manufacturing

The statistics is the basis for almost all the activities of individuals, group, society, community and country. For example:

- Literacy rate;
- Below poverty line people;
- Employment status;
- Satisfaction level for any activity;
- Exit polls ;
- Average rain fall;

- Average temperatures during different seasons;
- Average rainfall for constructing House, building or office etc.
- Earth quake statistics;
- All insurance activities are based on statistics;
- Risk taking and its predictions;
- Petroleum exploration;
- Monsoon activity in the region ;

- Election, Election analysis
- Height of students in this class
- Students' preference for coca-cola vs. pepsi-cola
- Number of siblings of individuals
- Amount paid for last haircut
- Gender breakdown
- Students' guesses

The first reason is to be able to effectively conduct research. Without the use of statistics it would be very difficult to make decisions based on the data collected from a research project. For example, in the study cited in Chapter One, is the difference in recorded absenteeism between psychiatric and obstetrics nurses large enough to conclude that there is meaningful difference in absenteeism between the two units? There are two possibilities: The first possibility is that the difference between the two groups is a result of chance factors. In reality, the two jobs have approximately the same amount of absenteeism. The second possibility is that there is a real difference between the two units with the psychiatric unit being more nurses missing work. Without statistics we have no way of making an educated

decision between the two possibilities. Statistics, however, provides us with a tool to make an educated decision. We will be able to decide which of the two possibilities is more likely to be true. We will base this decision on our knowledge of probability and inferential statistics.

The second reason to study statistics is to be able to read journals. Most technical journals you will read contain some form of statistics. Usually, you will find them in something called the results section. Without an understanding of statistics, the information contained in this section will be meaningless. An understanding of basic statistics will provide you with the fundamental skills necessary to read and evaluate most results sections. The ability to extract meaning from journal articles and the ability to critically evaluate research from a statistical perspective are fundamental skills that will enhance your knowledge and understanding in related coursework.

The third reason is to further develop critical and analytic thinking skills. Most students completing high school and introductory undergraduate coursework have at their disposal a variety of critical thinking and analytic skills. The study of statistics will serve to enhance and further develop these skills. To do well in statistics one must develop and use formal logical thinking abilities that are both high level and creative.

The fourth reason to study statistics is to be an informed consumer. Like any other tool, statistics can be used or misused. Yes, it is true that some individuals do actively lie and mislead with statistics. More often, however, well meaning individuals unintentionally report erroneous statistical

conclusions. If you know some of the basic statistical concepts, you will be in a better position to evaluate the information you have been given.

The fifth reason to have a working knowledge of statistics is to know when you need to hire a statistician. Most of us know enough about our cars to know when to take it into the shop. Usually, we don't attempt the repair ourselves because we don't want to cause any irreparable damage. Also, we try to know enough to be able to carry on an intelligible conversation with the mechanic (or we take someone with us who can) to insure that we don't get a whole new engine (big bucks) when all we need is a new fuel filter (a few bucks). We should be the same way about hiring a statistician.

Conducting research is time consuming and expensive. If you are in over your statistical head, it does not make sense to risk an entire project by attempting to compute the data analyses yourself. It is very easy to compute incomplete or inappropriate statistical analysis of one's data. As with the mechanic discussed above, it is also important to have enough statistical savvy to be able to discuss your project and the data analyses you want computed with the statistician you hire. In other words, you want to be able to make sure that your statistician is on the right track.

To summarize, the five reasons to study statistics are to be able to effectively conduct research, to be able to read and evaluate journal articles, to further develop critical thinking and analytic skills, to act as an informed consumer, and to know when you need to hire outside statistical help.

Statistics is the art of drawing conclusions about phenomena in which chance plays a role. The randomness may arise through a variety of reasons:

the intrinsic random nature of a phenomenon, unavoidable noise in an experiment, conscious randomization of experimental or measurement units, or as a best approximation to reality. The chance phenomena occur in a broad range of situations. This has rendered statistical science a highly multidisciplinary undertaking, but with a core body of concepts and methods that are common to the diverse applications.

The master track in Statistical Science provides students with a thorough introduction to the general philosophy and methodology of statistical modelling and data analysis, and offers two specializations: into the applications of statistical methods to the life sciences and to the behavioural sciences, respectively. Statistics play an important role in almost area of life now a days but in the field of economics that affects our lives the maximum statistics play a vital role. This role lies in the fact that economics depends upon statistics in connection with the formulation of economics laws and theories. There are mainly three reasons for its dependence:

Firstly, the economic laws relate to masses and tend to describe the behaviors of thousands of people. Statistics help in describing that behavior. Secondly, economic laws can be stated in a scientific way only when based on statistical data. The example consists of the laws of supply and demand. Thirdly, an economic phenomenon cannot be subjected to experimentation, for this reason the method of study is to be statistical rather than experimental.

In order to make planning realistic in any economy the objectives are set in quantitative terms. Statistics help in visualizing the target quantitatively and

evaluating the achievements. This in turn helps in our decision making in every field which includes business and other finance decisions as well.

Statistics helps in drawing general conclusions and in making predictions of how much of a thing will happen in given condition. Statistical techniques being powerful tools for analyzing numerical data, are used in almost every branch of learning. In biological and physical science, genetics, agronomy, anthropometry, astronomy, physics, geology etc are the main areas where statistical techniques have been developed and are increasingly used.

Statistics is used in summarizing the largest sets of data in a form that is easily understandable. Statistics is an effective planning in any field of inquiry. Statistics is used in summarizing the larger sets of data in a form that is easily understandable. Statistics assists in a effective planning in any field of inquiry. A modern administration whether in public or private sector, leans on statistical data to provide a factual basis for decision. A social scientist uses statistical methods in various areas of socio-economic life of a nation. Statistical techniques being powerful tools for analyzing numerical data, are used in almost every branch of learning. With the help of statistics we can draw general conclusions. A business man, an industrialist and a research worker all employ statistical methods in their work. Furthermore, in election polling, systems are also based on statistical methods. The common type of statistics that we can use in our daily lives is: – Numerical Statistics

- Pictorial Statistics
- Descriptive Statistics
- Sectoral Statistics
- Private Statistics

The interval of bus, the daily number of bus for each route, the exchanging time of traffic light etc..

Statistics as a subject allows students to explore the use of an array of diagrams in real-life data situations, such as box-and-whisker diagrams and stem-and-leaf diagrams. Also in the syllabus is learning complex, subject-specific vocabulary such as the ‘median’, the ‘inter-quartile range’, and ‘cumulative frequency’. Once students have succeeded in gaining this ground knowledge, their techniques in collecting data in the form of questionnaires fairly can be put to the test in a two-hour exam. As you can imagine, this numeracy-heavy subject tends to be taken as a complement to GCSE Maths, which students will generally be taking at a Higher level when involved with this course. There can be considerable overlap between the two subjects, meaning that there is less to study.

Statistics on a school’s performance are also important in education. When parents are due to make their decisions on where their children should learn for the next five to seven years, a school’s success rates in Maths, English and Science (usually expressed as percentages), will be instrumental in their decision rating. In Further Education, there are also statistics used to show how many students are achieving As and Bs in certain subjects. This can be important for boosting the morale of students, showing them that they too could be one of the strongest performers in an examination environment.

Statistics is primarily a problem solving field of study and knowledge.

Statisticians should have a drive and desire to solve mathematical and data problems, and should get satisfaction from working towards a solution. A

good statistician should not feel beaten or defeated by a problem, even if it appears difficult – instead, they should rise to the challenge of coming up with the solution.

Statistics is also all about understanding and interpreting data. A good knowledge of mathematics is obviously essential, but statistics also requires strong communication skills in order to discuss data and any problems surrounding it. Statisticians usually work within a team, for example, with other statisticians, or as advisers to businesses, so they need to be able to communicate effectively with others within a professional environment. In addition, difficult problems require a team effort, and in order to fully understand the data at hand, communication may be essential.

Furthermore, statistics is about being knowledgeable in general. Statistics is not usually an isolated field – as I said above, statisticians usually work within businesses or companies. Therefore, they need a good knowledge base about the field in which they work, whether it be fashion, food, medicine or automobiles. Strong knowledge about your specific field allows a statistician to interpret data more accurately, and draw more reliable and applicable conclusions from the data in order to benefit the company or business.

Statisticians also work closely with computing technology, so should be well-versed and experienced in the latest data programming and organizing technology. Today, statisticians work with such vast amounts of data on such a regular basis that the role of computer technology cannot be ignored in the field of statistics. Statisticians should therefore be not only proficient, but

confident, in using technology and software and applying it to particular sets of data. Statistics is a mathematical science involving the collection, interpretation, analysis, and presentation of data. It is often used to make predictions based on data. It is widely applicable in various social and natural sciences as such as political science and medicine as well as in business such as the insurance industry. For example, statistics are a very important part of political campaigns as they lead up to elections. Every time a scientific poll is taken, statistics are used to calculate and illustrate the results in percentages and to calculate the margin for error.

Statistics are also used in psychology. People's behavior can be measured on a bell curve. Most people fall within acceptable ranges of the bell curve. However the people who fall outside " the norm" or on the " fringe" of the bell curve may be considered unstable.

Statistics are very important in various aspects of business; a terrific example is the insurance industry. It is the job of an actuarial scientist to determine how long people will live (statistically), how likely they are to have an accident, and how likely is it their home will burn down or be damaged in a hurricane? These risks are all rated based solely on statistical data and policies are priced accordingly.

As stated earlier, Statistics is a discipline that has finds application in the most diverse fields of activity. It is perhaps a subject that should be used by everybody. Statistical techniques being powerful tools for analyzing numerical data are used in almost every branch of learning. In all areas,

statistical techniques are being increasingly used, and are developing very rapidly.

i. A modern administrator whether in public or private sector leans on statistical data to provide a factual basis for decision. ii. A politician uses statistics advantageously to lend support and credence to his arguments while elucidating the problems he handles. iii. A businessman, an industrial and a research worker all employ statistical methods in their work. Banks, Insurance companies and Government all have their statistics departments. iv. A social scientist uses statistical methods in various areas of socio-economic life a nation. It is sometimes said that “ a social scientist without an adequate understanding of statistics, is often like the blind man groping in a dark room for a black cat that is not there”. Well the great thing about statistics is that it is just about everywhere. When you say ‘ other fields’ I am assuming you mean, other than at a learning level in school/college.

Look in a newspaper, you will see stat for sports, weather, Election polls, the effect of the dollar drop on GDP and the inflation rate. You can use it for breeding animals, and estimate a very educated guess on breeding success rates and the likes.

This is one subject that is used just about every where.

Although the advancement of medicine has prolonged and improved the life of many people over the years, it is important to remember that it is not an exact science. While some treatments do seem to offer a complete ‘ cure’ for any particular ailment universally, the vast majority of medicinal treatments do not.

As such, it is important that statistics are used in medicine in order to justify the development and subsequent use of a particular drug or treatment; as well as identifying in the first place whether it is having the desired effect at all.

At the heart of the use of statistics in medicine is the seemingly insurmountable problem that everybody is different. Not only in a psychological sense, but a physiological sense too. While human beings may share similar organs, tissues and chemical compounds; how they are bonded, how we are composed and the effects different drugs have on the individual can be radically different from one person to the next.

Therefore, to measure the effectiveness of any form of medication, it is important to run trials where a wide variety of subjects are administered the drug. Firstly, this helps gauge the effectiveness of the medicine when compared to, for example, a placebo. Subsequent statistical analysis can also give medical professionals and pharmaceutical companies the information they need to judge whether the medicine is an effective treatment for the majority of patients; and whether it is a cost-effective solution to a particular ailment.

Furthermore, once initial studies have been concluded and analyzed statistically, follow up studies can be initiated to investigate the initial statistical findings; providing further evidence as to the effectiveness of any form of treatment.

To briefly summarize; we use statistics in medicine to ensure that the care provided works and is to the benefit of as many people as possible, with as

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few detrimental affects possible. Many pioneering medical discoveries such as cures for infectious diseases were found by doctors with an interest in statistics, highlighting the increasing importance of statistics in medicine today. The presence of statistics can be observed in many fields of health care and medicine, such as genetics where it is implemented to determine possible indicators of genetic abnormalities, such as birth defect and aging. It is also used in clinical trials for public health to diagnose disease, find new ways in which to prevent disease, prolong life, and promote health. Epidemiology uses statistics to calculate cancer incident rates, monitor disease outbreaks and monitor changes in health-related behaviours such as smoking and physical activity.

Also, statistics is used in pharmacy to work in drugs discovery and development and to ensure the validity and accuracy of findings at all stages of the process. Statistics is important for all kinds of activities. By statistics you may guess the efficiency of something. Statistics always help us to have a calculative assumption over something. In medicine, through the proper use of statistics you can observe how much effective a particular drug over a particular disease and thus you can be more accurate in choosing your decision. Medical statistics provide useful information about, for example, incidence of disease (epidemiology) versus prevalence, transmission rates of communicable infections, clustering of diseases, mortality rates and so on. Statistics can be used to plan for interventions, including the number and type of staff who need to be deployed to an area, the funds and other physical resources which need to be attributed to deal with what is

occurring. Medical statistics are vital for clinical research, forensic medicine and public health.

To maintain balance in commerce and the supply of everyday need of every citizen. For example, census are conducted to know how many citizen there is. Also the government keeps statistics on automobile accidents, together with private companies monitoring statistics of sales to keep up providing for every demand in all areas. Like most people, you probably feel that it is important to “take control of your life.” But what does this mean? Partly it means being able to properly evaluate the data and claims that bombard you every day. If you cannot distinguish good from faulty reasoning, then you are vulnerable to manipulation and to decisions that are not in your best interest. Statistics provides tools that you need in order to react intelligently to information you hear or read. In this sense, statistics is one of the most important subject matter that you ever study. To be more specific, here are some claims that we have heard on several occasions. (We are not saying that each one of these claims is true!) * 4 out of 5 dentists recommend Dentyne

* Almost 85% of lung cancers in men and 45% in women are tobacco-related. * Condoms are effective 94% of the time.

* Native Americans are significantly more likely to be hit crossing the streets than are people of other ethnicities. * People tend to be more persuasive when they look others directly in the eye and speak loudly and quickly. * Women make 75 cents to every dollar a man makes when they work the same job. * A surprising new study shows that eating egg whites can increase one’s lifespan. * People predict that it is very unlikely there will ever

be another baseball player with a batting average over 400. * There is an 80% chance that in a room full of 30 people that at least two people will share the same birthday. * 79. 48% of all statistics are made up on the spot.

All of these claims are statistical in character. We suspect that some of them sound familiar; if not, we bet that you have heard other claims like them.

Notice how diverse the examples are. They come from psychology, health, law, sports, business, etc. Indeed, data and data-interpretation show up in discourse from virtually every facet of contemporary life.

We live in the Information Age where we understand a great deal about the world around us. Much of this information was determined mathematically by using statistics. When used correctly, statistics tell us any trends in what happened in the past and can be useful in predicting what may happen in the future.”

Some more practical application of statistics are :

Weather Forecasts :

In weather forecast computer models are built using statistics that compare prior weather conditions with current weather to predict future weather.

Genetics :

Many people are afflicted with diseases that come from their genetic make-up and these diseases can potentially be passed on to their children.

Statistics are critical in determining the chances of a new baby being affected by the disease. Consumer Goods :

Wal-Mart a worldwide leading retailer, keeps track of everything they sell and use statistics to calculate what to ship to each store and when.

Quality Testing :

Companies make thousands of products every day and each company must take sure that a good quality item is sold. But company can't test each and every item that they ship to the consumer. So the company uses statistics to test just a few, called a sample, of what they make. Stock Market :

Stock analysts also use statistical computer models to forecast what is happening in the economy.

Conclusion :

Statistics has come to play an important role in almost every field of life and human activity. There is hardly any field where statistical data or statistical methods are used for one purpose or the other our arrival in this world and departure from here are recorded as statistical data somewhere and in same form.

Statistics Project :

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Contents :

- * Definition of Statistics
- * Importance of Statistics
- * Practical Application of Statistics
- * Conclusion