

## **CROP PRODUCTION-ENSEMBLE MACHINE LEARNING MODEL FOR PREDICTION**

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### **ABSTRACT**

Information Mining is the most extreme conceivable technique for the predominant virtual worldwide for perusing mass of records units to acquire left out relationship. The methodology utilized for assessing measurable records over a time period is the time assortment assessment. This technique is clinical and reliable in deciding events to see over a period. Likelihood of assembling ought to constantly be supposed to the near flawlessness with the guide of utilizing time assortment assessment. In this work, dinner fabricating is the pushed-for expectation. The recognized sort techniques in this investigation are the Linear Regression (LR) and Naive Bayes. In the Linear Regression and Naive are the proposed outfit adaptation used to task the harvest fabricating over a time period. This troupe adaptation is when contrasted with Linear Regression and Naive Bayes techniques. The boundaries involved each in turn for the forecast of the result are the exactness and the sort of blunder. The finding yields that Linear Regression and Naive are more pleasing than Linear Regression and Naive Bayes for the records set broken down.

**Keywords:** Data Mining, Time Series, Crop Yield Prediction, Linear Regression, Naive Bayes.

### **1.INTRODUCTION**

Presently with the mind-blowing improvement of pc innovation, a series of measurement sets, type and carports have magnificently expanded. This has made a monstrous substitute in Pattern acknowledgment.[1] A utility is progressed through the method of a method for the use of an exceptional programmed set of rules inside the area of Data mining. Machine getting to realize has been progressed in Data Mining as a form in getting to know the thought-through method of a method for the use of the pc. Given gigantic insights units, the expectation of late units of measurements has progressed the utilization of getting to know the thought-through method, a method for this rendition through the method of a method for tutoring and testing. Fully intent on foreseeing a result, growing a variant with the thing of delivering type is prominently known as demonstrating. The sort in measurements mining technique is anticipating the cost of an objective variable through the method of a method for creating an adaptation basically founded absolutely on a couple of traits express factor. By this strategy, kind of a given measurement is principally founded absolutely on class names and tutoring.

The time assortment insights are a factual measurement estimated at a chosen time c program language period over a period. The assessment principle to end in this measurement for predetermination forecast is known as time assortment assessment. A goliath area for time assortment assessment is a style in crop fabricating.[2] In this paper, the crop-producing style has generally suggested the use of measurements mining prescient techniques comprising of Support Vector machines and Naive Bayes, which additionally can be alluded to as classifier systems withinside the assessment of time assortment insights units is utilized. For the reason for diminishing the slip-up value and to develop the expectation precision, supporting is similarly done. Joining immaterial and weak forecast rules for developing framework orientated getting to know known as Boosting. It is utilized to reduce predisposition and difference in framework getting to be aware to change weak beginners to tough ones through the method of a method for this group Meta set of rules.

A Brief overview of past Related work is mentioned in Section II, Process are mentioned in Section III and Conclusion in Section IV.

### **ENSEMBLE MACHINE LEARNING**

These monstrous assortments of information put away on unique designs quickly became overpowering. This underlying tumult has prompted the formation of organized information bases and data set administration frameworks (DBMS). The proficient data set administration frameworks have been vital resources for the board of a massive corpus of information and particularly for powerful and productive recovery of specific data from an enormous assortment at whatever point required. The expansion of data set administration frameworks has likewise added to the vast social event of a wide range of data. Today, we have

more data than we can deal with: from deals and logical information to satellite pictures, text reports and military insight. Data recovery is insufficient any longer for independent direction. Defied with enormous assortments of information, we have now made new necessities to assist us with pursuing better administrative decisions. These requirements are programmed synopsis of information, extraction of the "substance" of data put away, and the revelation of examples in crude details. With the considerable measure of information put away in records, data sets, and different vaults, it is progressively significant, if excessive, to foster solid means for investigation and maybe to understand such information and for the extraction of fascinating details that could help in an independent direction. Information Mining, additionally famously known as Knowledge Discovery in Databases, alludes to the nontrivial extraction of certain, beforehand obscure and possibly helpful data from information in data sets. While information mining and information revelation in data sets are much of the time treated as equivalents, information mining is entire of the information disclosure process.[2]

It is normal to consolidate a portion of these means together. For example, information cleaning and information incorporation can be performed all together handling stage to produce an information distribution center. Information choice and information change can likewise be joined where the combination of the information is the after effect of the determination. Concerning information distribution centers, the decision is made on changed details.[1,2] The KDD is an iterative interaction. When the found information is introduced to the client, the assessment measures can be upgraded, the mining can be additionally refined, new information can be chosen or further changed, or new information sources can be incorporated to get unique, more proper outcomes. Information mining gets its name from the similitudes between looking for essential data in an enormous data set and digging rocks for a vein of crucial minerals. Both suggest either filtering through a lot of material or cleverly testing the material to precisely pinpoint where the qualities live. It is, nonetheless, a misnomer since digging for gold in rocks usually is called "gold mining" and not "rock mining," accordingly, by similarity, information mining ought to have been designated "information mining," all things considered. In any case, information mining turned into the acknowledged standard term and quickly a pattern that even eclipsed more broad terms like information disclosure in data sets (KDD) that portray a complete interaction. Other comparative terms alluding to information mining are information digging, information extraction and example exposure.

### **DATA MINING TECHNIQUES**

Information mining calculations exemplify strategies that have once existed for a long time.[6] However, they have recently been applied as solid and versatile instruments that consistently beat more seasoned traditional measurable techniques. While information mining is still in its early stages, it is turning into a pattern and universal. Before information mining forms into a regular, full-grown and believed discipline, many as yet forthcoming issues must be tended to. A portion of these issues is managed beneath. Note that these issues are not selective and are not arranged in any way. Security is a significant issue with any shared information assortment and is also expected to be utilized for crucial direction. Likewise, when information is gathered for client profiling, client conduct, corresponding individual information with other data, and so on, a lot of delicate and private data about people or organizations is accumulated and put away. This becomes questionable given the personal idea of a portion of this information and the expected illicit admittance to the data.

Additionally, information mining could reveal new information about people or gatherings that could be against protection approaches, particularly assuming there is an expected scattering of found data. Because of the worth of information, data sets of a wide range of content are consistently sold, and due to the upper hand that can be achieved from understood information found, some critical data could be kept. In contrast, other data could be generally dispersed and involved without control. Many artificial reasoning and measurable strategies exist for information investigation and understanding. Nonetheless, these techniques were frequently not intended for the substantial informational collections information mining is managing today. Terabyte sizes are standard. This raises the issues of adaptability and productivity of the information mining techniques while handling extensively colossal information. Calculations with dramatic and, surprisingly, medium-request polynomial intricacy can't be helpful for information mining. Straightforward calculations are typically the standard. In the same subject, examining can be utilized for mining rather than the entire dataset. Notwithstanding, concerns, for example, fulfillment and selection of tests, might emerge. Different points in the issue of execution are gradual refreshing and equal programming. There is no question that parallelism can assist with the size issue if the dataset can be partitioned and the outcomes can be blended later. Steady refreshing is significant for combining results from equal mining or refreshing information mining results when new information opens up without re-dissecting the total dataset.

### **YIELD PREDICTION**

In this part, we will talk about yield misfortune systems, yield investigation and normal actual plan techniques to further develop yield. Yield is characterized as the proportion of the quantity of items that can be

offered to the quantity of items that can be fabricated. Ordinary creation process duration is north of about a month and a half. Individual wafers cost different a huge number of dollars. Given such colossal speculations, predictable high return is essential for quicker time to benefit. Disastrous Yield Loss. These are practical disappointments, for example, open or shortcircuits which make the part not work by any means. Extra or missing material molecule absconds are the essential drivers for such disappointments. Basic region investigation is utilized to foresee this kind of yield misfortune and is examined later in this part. Parametric Yield Loss.[8] Here the chip is practically right yet it neglects to meet some power or execution standards. Parametric disappointments are brought about by variety in one or set of circuit boundaries, with the end goal that their particular circulation in a plan makes it drop out of determinations. For instance, parts might work at specific VDD, yet not over entire required range. Another model wellspring of parametric yield misfortune is spillage in profound sub-micron advances. Parametric disappointments might be brought about by process varieties. A few sorts of coordinated circuits are speed-binned (for example assembled by execution). A typical illustration of such class of plans is microchips wherein lower execution parts are evaluated lower. The other class is regular ASICs which can't be sold in the event that the exhibition is under a specific edge (for instance because of consistence with principles). In the last option case, there can be critical execution restricted yield misfortune which is the reason such circuits are planned with an enormous watchman band. In the previous case as well, there can be huge dollar esteem misfortune regardless of whether there is little yield misfortune. It is vital to comprehend that both irregular and efficient deformities can cause parametric or devastating yield misfortune. For instance, lithographic variety which is regularly methodical and design ward can cause disastrous line-end shortening driving door not shaping and henceforth a useful disappointment. A less uncommon version of lithographic variety is entryway length variety making doors on basic ways accelerate a lot prompting hold-time infringement under specific voltage and temperature conditions.[8]

## **II. RELATED WORK**

Cheng Zhou, Boris Cule et al. have proposed In this paper, Sequence grouping is a significant assignment in information mining. We address the issue of grouping arrangement utilizing rules made out of intriguing examples found in a dataset of marked successions and going with class names. We measure the fascinating quality of an instance in a given class of groupings by joining the attachment and the help of the model. We utilize the found models to produce specific grouping rules and present two unique approaches to building a classifier. The principal classifier depends on a better form of the current strategy for grouping given affiliation rules. The second positions the standards by first estimating their worth intended for the new information object. Trial results show that our rule-based classifiers outflank existing similar classifiers concerning precision and soundness. Furthermore, we test various example highlight-based models that utilize multiple types of measures as elements to address each arrangement as a component vector. We then apply an assortment of AI calculations for succession characterization, tentatively showing that the standards we find address the arrangements well and demonstrate power for the grouping task.[1]

Bo Tang et al. have proposed In this paper., we present a Bayesian characterization approach for programmed message order utilizing class-explicit elements. Dissimilar to the standard methodologies for text order, our proposed strategy chooses a particular component subset for each class. To apply these class-subordinate highlights for order, we follow Baggenstoss' PDF Projection Theorem to reproduce PDFs in crude information space from the class-explicit PDFs in low-layered include space and fabricate a Bayes grouping rule. One perceptible meaning of our methodology is that most component choice standards, for example, Information Gain (IG) and Maximum Discrimination (MD), can be handily consolidated into our methodology. We assess our strategy's characterization execution on a few certifiable benchmark informational collections, contrasted and the cutting edge highlight choice methodologies. The overall outcomes exhibit the adequacy of the proposed approach and further demonstrate its wide possible applications in text order.[2]

P. Samuel Quinan et al. have proposed In this paper that Meteorologists process and break down weather conditions figures involving perception to analyze the ways of behaving and connections among weather conditions highlights. In this planning study led by meteorologists in choice help jobs, we recognized and endeavored to address two critical normal difficulties in climate representation: the work of conflicting and frequently incapable visual encoding rehearses across a wide scope of perceptions and an absence of help for straightforwardly envisioning how different weather conditions highlights relate across an outfit of conceivable gauge results. In this work, we present a portrayal of the issues and information related to meteorological measures, we propose a bunch of informed default encoding decisions that incorporate existing meteorological shows with successful perception practice, and we broaden a bunch of strategies as an underlying advance toward straightforwardly envisioning the connections of different elements over an outfit figure. We examine the combination of these commitments into a practical model device and consider the numerous practical difficulties that emerge while working with climate information.[3]

Entropy is based on thoroughly joining expectation rendition for the unit crop yield forecast. The dark determining adaptation and outspread establishment highlight brain local area measuring designs are mixed with

blasting the exactness of expectation. This combination of measuring adaptation is significantly less unsteady in exercise and extra natural and attainable. A solitary framework acquires information on variants utilized to cure the yield decision issue. In their artistic creations, a way named Crop Selection Method (CSM) is proposed to see the harvest decision of an area. The finish of the compositions is that the web crop yield will increment through the best decision of vegetation the utilization of CSM. The outcomes demonstrate that the exactness of Prediction is excellent with moderate figuring assets by utilizing the Bayesian methodology.[4]

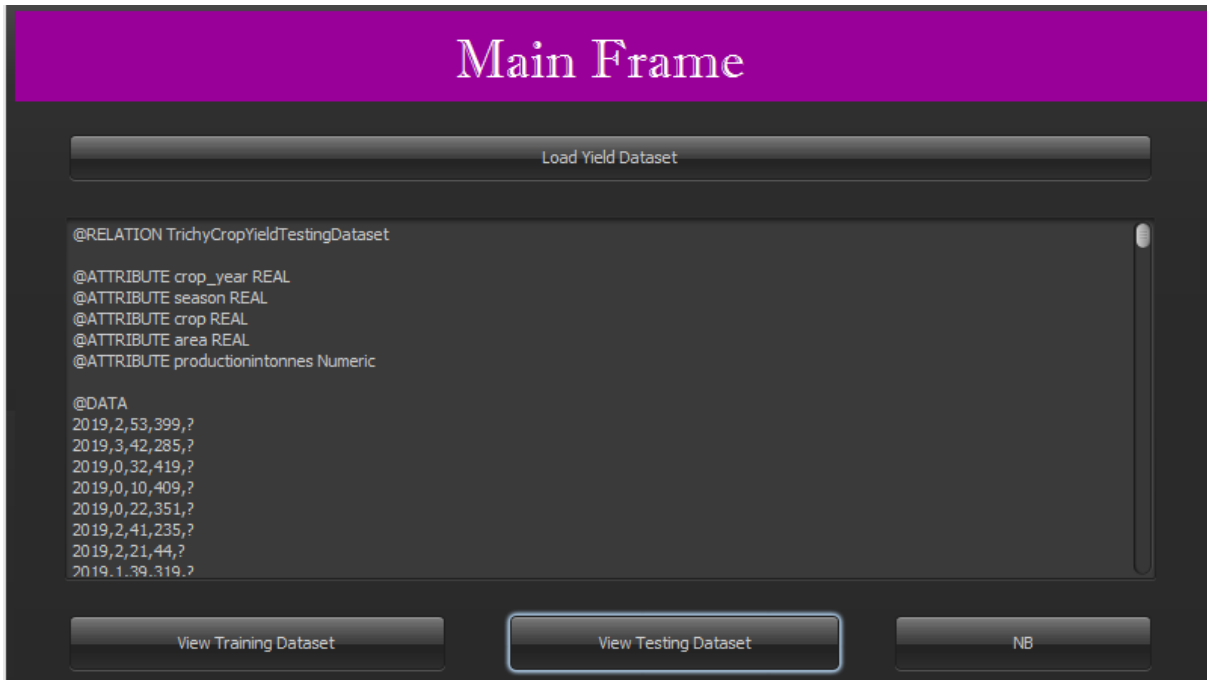
Julie Betbederet. al has in this paper the assessment of crop yield assumes a significant part in dynamic and the directors of food force. This paper expects to assess sludge dry millions and grain yield at field scale exercising an agro meteorological model. The SAFY- WB model( straightforward computation for yield model joined with a water balance) is constrained by the green region list( GAI) got from optic satellite Filmland( GAIopt), and the GAI got from finagled opening radar( SAR) satellite filmland( GAIsar) attained further than two crop seasons( 2015 and 2016) in the southwest of France. Landsat- 8 charge gives the optic information. SAR data(  $\sigma \circ V$ ,  $\sigma \circ V H$ , and  $\sigma \circ V H/ V$ ) is given by guard- 1A charge through two rakehell standardized circles( 30 and 132), permitting a humdrum from 12 to 6 days.  $\sigma \circ V H/ V$  is effectively used to infer GAIsar(  $R2 = 0.72$ , relative root mean square boob( rRMSE) = 10.4) over the splint advancement phases of the crop cycle from a nonlinear capacity. Other SAR signals (  $\sigma \circ V$  and  $\sigma \circ V H$ ) are an excess linked with soil moistness changes. At commodity, contrary to GAIopt, GAIsar can't be employed alone in the model to precisely gauge foliage boundaries. At last, the power of the Issues comes from the mix of GAI got from SAR and optic information. In this condition, the model is able, because of the consideration of another" creation module," to recreate dry millions and yield(  $R2 > 0.75$  and  $rRMSE < 12.75$ ) with great exhibitions in the characteristic methodology. [5]

### **III. PROPOSED SYSTEM**

In this paper, estimating harvest creation is finished by utilizing the time series informational collection precisely as the current models. By using the method, outfit models like Linear Regression and Naive are created. To bring feeble students who are delayed in learning, the Prediction strategy helps their comprehension. When gotten together with Prediction (Linear Regression), Straight Regression will make unrivaled characterization by giving frail students proper preparation. A like technique is utilized for the Naive Bayes classifier in which Prediction based Naive Bayes (Naive) is used to create unrivaled grouped information. Portrays the framework execution where the mass of verifiable yield creation information and environment information is accumulated and is made to information preprocessing work. In the info preprocessing, the information's are join and chosen for the review. The models are created by grouping the mass of information using Linear Regression and Naive Bayes demonstrating procedures. It very well might be seen that it is additionally grouped to work on the presentation with the assistance of Linear Regression (Linear Regression) and Naive Bayes (Naive). Finally, the models are assessed by correlation.

### **DATA PREPROCESSING**

Hear the crude information in the harvest information is cleaned, and the metadata is annexed to it by eliminating the things which are changed over to the number. In this way, the information is not difficult to prepare. Hear every one of the information. In this pre-handling, we initially burden the metadata into this, and afterward, this metadata will be appended to the information and supplant the changed over information with metadata. Then, at that point, this information will be moved further and eliminate the undesirable information in the rundown. Finally, it will isolate the info into the train and the test information. For this parting of the report into train and test, we want to import `train_test_split`, which in the scikit-learn will help the pre-handled information divide the data into train and test indicated by the given weight given in the code. The division of the test and train is done in 0.2 and 0.8, which is 20 and 80 percent separately.



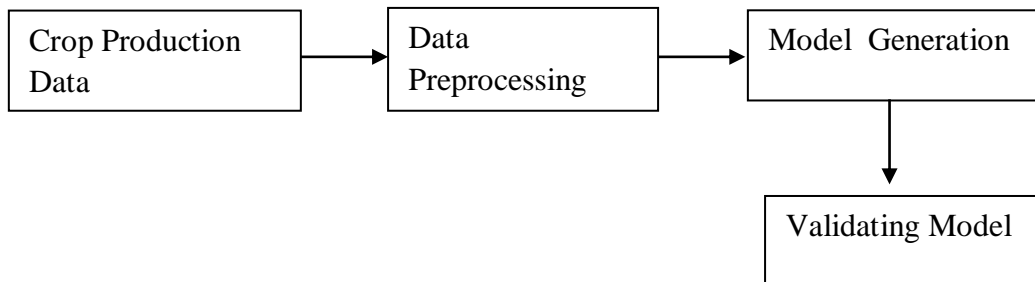
**FEATURE SELECTION**

Highlight determination alludes to the method involved with applying objective tests to inputs, given a predefined yield. The objective is to determine which sections are more visionary of the result. Apply the AI strategies useful for observing harvest yield for any new information in the report. After this information, procurement appropriate AI calculation should be applied to figure the effectiveness and ability of the model; here, we have used different AI calculations. The Filter Based Feature Selection module gives additional element determination calculations to look over.[4]

| Attributes             | Type                 |
|------------------------|----------------------|
| Crop Year              | Independent Variable |
| Season                 | Independent Variable |
| Crop Real              | Independent Variable |
| Area                   | Independent Variable |
| Productiontone Numeric | Dependent Variable   |

**FEATURE EXTRACTION**

Include extraction includes lessening the number of assets expected to depict a vast arrangement of information. So we broke down that the proposed model has more productivity than the current model for observing harvest yield. The execution of the above framework would help better develop the agrarian acts of our country. Further, it very well may be utilized to lessen the misfortune looked by the ranchers and further develop the harvest respect get better capital in horticulture. Many AI experts accept that appropriately upgraded highlight extraction is the way to viable model development.[7]

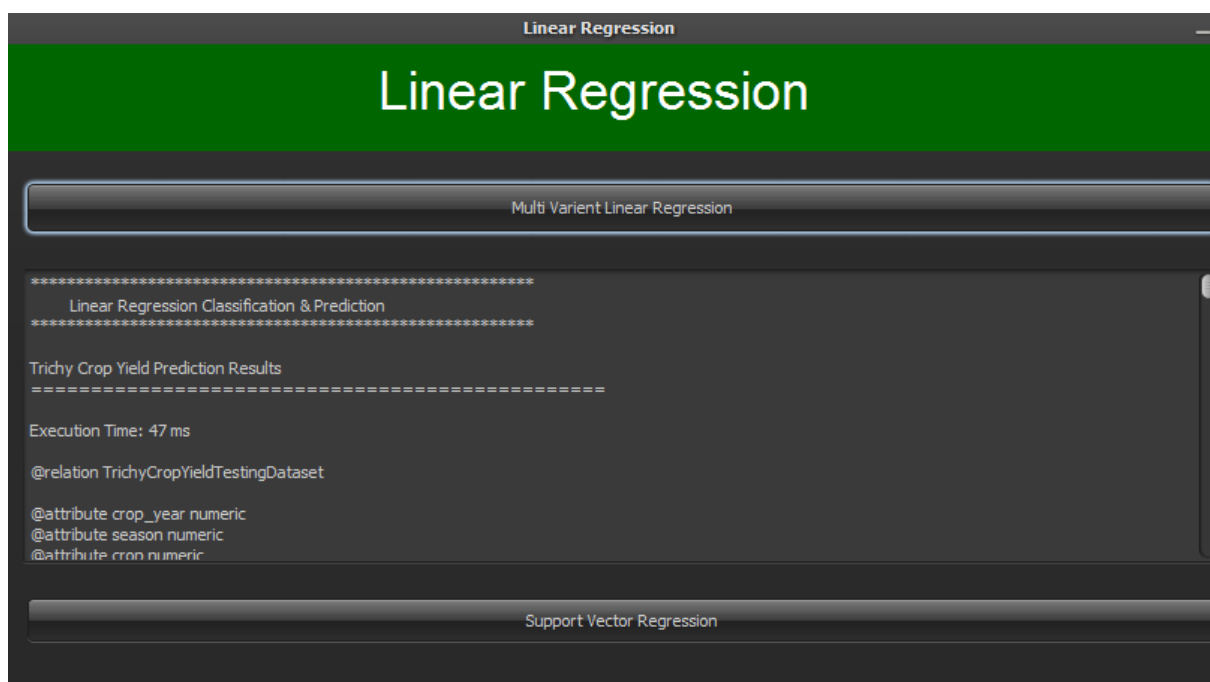


**CLASSIFICATION ALGORITHM  
 LINEAR REGRESSION**

Direct relapse is a straightforward way to deal with demonstrating the connection between a scalar reaction and at least one defining factor (otherwise called reliant and free factors). The instance of one informative variable is called straightforward direct relapse; for multiple, the cycle is called different straight relapses. This term is particular from multivariate direct relapse, where numerous associated subordinate factors are anticipated instead of a solitary scalar variable. In straight relapse, the connections are demonstrated by exercising straightforward index works whose obscure model boundaries are assessed from the information. Such models are called straight models. The restrictive mean of the reaction, given the upsides of the illustrative factors (or indicators), is usually thought to be a relative capacity of those qualities; less regularly. Like all types of relapse examination, straight relapse centers around the reaction's restrictive likelihood appropriation given the indicators' upsides instead of the joint likelihood dispersion of these factors, which is the area of multivariate investigation.

Direct relapse is discussed as a method utilized to investigate a reaction variable Y that changes with the worth of the mediation variable X. A methodology of anticipating the value of a reaction variable from a given worth of the illustrative variable is also alluded to as expectation. The most un-square fit, which is equipped for fitting both straight and polynomial connections, is the most commonly utilized direct relapse. The methodology of applying model gauge to values outside the space of the first information is known as extrapolation.

The straight relapse is the most elevated in execution time examination when contrasted and credulous Bayes.



| Crop Year | Season Numeric | Crop Numeric | Area Numeric | Production Numeric |
|-----------|----------------|--------------|--------------|--------------------|
| 2022      | 0              | 43           | 1            | 29372              |
| 2022      | 3              | 32           | 305          | 18893              |
| 2022      | 0              | 25           | 366          | 12225              |
| 2023      | 2              | 25           | 272          | 12225              |
| 2023      | 1              | 28           | 352          | 15082              |

**NAIVE BAYES**

Given the Bayesian hypothesis, the Naive Bayes arrangement strategy is created. At the point when the worth of sources of info is exceptionally high, this procedure is generally appropriate. Straightforward Bayes or Idiot Bayes are different names of Bayes classifiers. The likelihood of a b case in class in (P(a), P(x), and P

(x|a)) is addressed by the Bayes hypothesis. The picked class means the likelihood of creating a b occurrence. This means the likelihood of the event is the likelihood of the occurrence of d. Whenever the trait is single, this order hypothesis is made without any problem.[10]

The Naive Bayes grouping is finished by expounding this theory for different characteristics by utilizing the equation where the likelihood of class is meant by (which produces the incentive for property 1, the possibility of the type demonstrated creates the motivation for second quality. Consequently, by the presumption that the traits ought to have autonomous dispersions, Naive Bayesian makes his investigation utilizing the equation utilized to obtain significant outcomes in anticipating. The main benefit of the Naive Bayesian examination is that it is quick to prepare and group. Also, Naive Bayesian isn't touchy about unimportant elements. Its premise is genuine and discrete information and oversees streaming information too. Gullible Bayes utilizes the likelihood of harvest being filled in those conditions. Subsequently, probabilities are determined in the accompanying outcome, and crops are most likely picked for additional last accumulation. In exactness comparison, the naive Bayes has the most significant rate when contrasted with straight relapse.



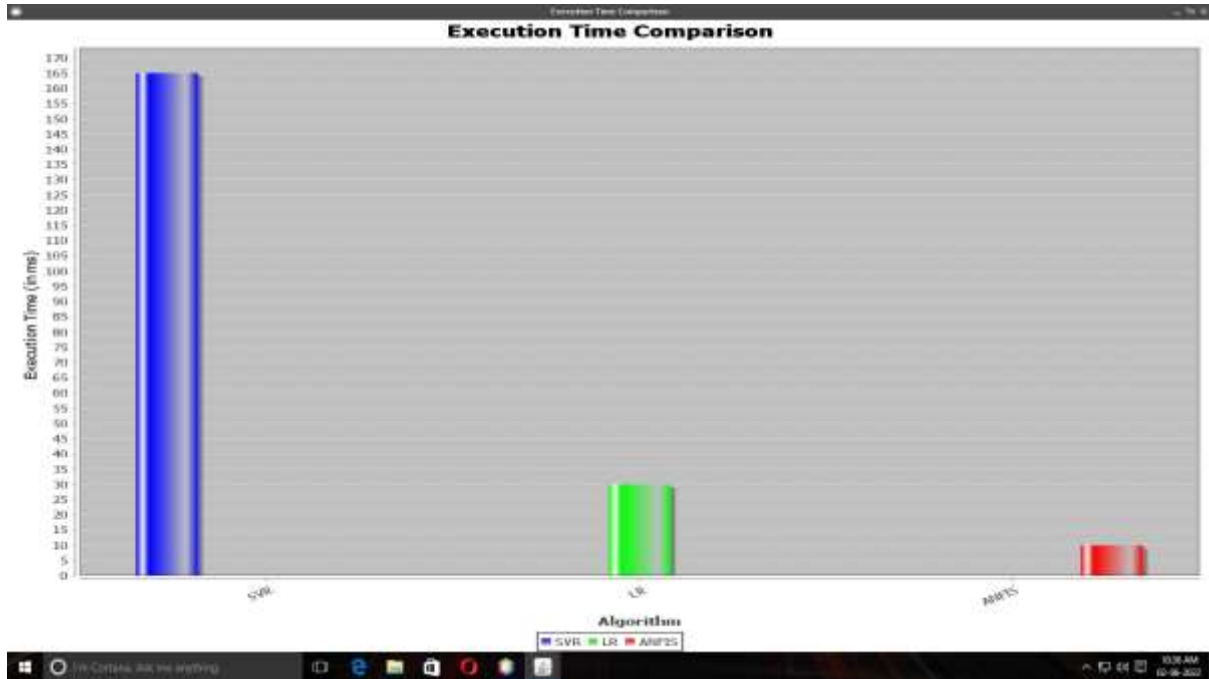
| Crop Year | Season Numeric | Crop Numeric | Area Numeric | Production Numeric |
|-----------|----------------|--------------|--------------|--------------------|
| 2022      | 0              | 43           | 1            | 23417              |
| 2022      | 3              | 32           | 305          | 5585               |
| 2022      | 0              | 25           | 366          | 250                |
| 2023      | 2              | 25           | 272          | 7376               |
| 2023      | 1              | 28           | 352          | 3376               |

### **CROP YIELD PREDICTION ANALYSIS**

Farming information is being created continually and enormously. Accordingly, farming information has come in a period of significant information. Savvy advancements contribute to information assortment utilizing electronic gadgets. Our venture will examine and mine this agrarian information to obtain beneficial outcomes utilizing advancements like information examination and AI. This outcome will be given to ranchers for better harvest yield regarding proficiency and efficiency.[9] The work will assist ranchers with expanding the result of their harvests. Additionally carried out a Naive Bayes calculation for figuring out the specific crop. Subsequently, we executed a framework to foresee the harvest name and surmise yield in a particular homestead. Gullible Bayes utilizes the likelihood of harvest being filled in those conditions. Henceforth, the accompanying outcome probabilities are determined, and crops are most likely picked for additional last amassing.

### **EXPERIMENTAL RESULT**

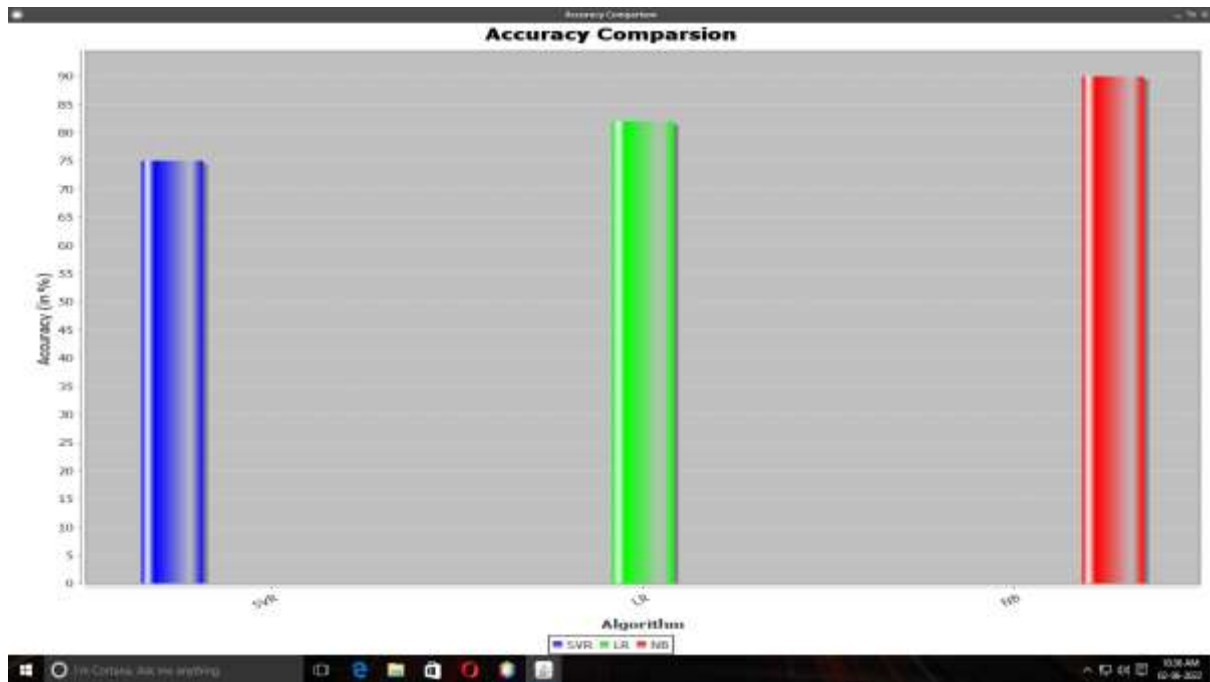
Straight relapse, Naive Bayes is the arrangement techniques utilized for the time series figure in this paper. Two gatherings are isolated from the informational index to prepare and test the calculations of arrangement. The device used is Rapidminer information investigation to carry out the arrangement calculations.



| ALGORITHM         | ACCURACY (In %) |
|-------------------|-----------------|
| Linear Regression | 83              |
| Naïve Bayes       | 90              |

| ALGORITHM         | EXECUTION TIME(In min) |
|-------------------|------------------------|
| Linear Regression | 30                     |
| Naïve Bayes       | 10                     |





"Peruse CSV" administrator of rapidminer device is first stacked for Secondary information held in CSV record. Just a subset of information is chosen from the stacked information for the arrangement process. To select a subset from unique details, "Select Attributes" are used by the administrator. The picked subset is also exposed to the "X-Validation" director. It fosters the older model, which is approved by the test information. Straight relapse and Naive Bayes are carried out for order by utilizing the "X-Validation" administrator. The presentation of the order calculation is assessed by using the exhibition administrator. Execution assessment was accomplished for both the order calculations.

#### IV. CONCLUSION

The time series investigation of harvest yield forecast is exposed to examination by the current strategies direct relapse and Naive Bayes with the proposed strategy. It very well might be closed from the outcomes that there is an excellent measure of flawlessness in the precision of expectation and a great measure of fall in the level of exactness in both the proposed procedures. Future exploration can illuminate the review of whether changing the method creates improved outcomes or expanding the informational information collection for a similar strategy results in a change in the discoveries. Significance of harvest expectation is exceptionally required for horticulture and the economy. Ceaseless exploration for working on new techniques for expectation would be productive. This task is a start for additional investigation in anticipating.

The result will be helpful for the ranchers to know the Yield of the harvest along these lines; he can go for the better yield, which gives a high return and say them the productive utilization of compost so he can involve just the necessary measure of manures for that field. This way, we can assist the ranchers with developing the harvest, which gives them improved yield.

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