



FERTILIZER PREDICTION THROUGH BIG DATA ANALYTICS

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Abstract:

Objective: To predict a suitable fertilizer that yields profitable results for a given plant soil combination with the help of Big Data analytics. A fertilizer is any material of natural or synthetic origin that is applied to soils or to plant tissues to supply one or more plant nutrients essential to the growth of plants. It is the basic source of agricultural crops that helps most of the farmers yield profitable result. The type of soil and the plant plays a vital role in production. Every combination of soil and plant are unique and they require different form of nutrients. So the type of fertilizer required for them also vary. Farmers may not know the exact requirement by the soil or plant until they get the result. Hence, farmer in one region may end up with good yield due to the right selection of fertilizer while farmer in a different region with same type of soil and plant yield improper result. Though, the surveys are useful to find out the right type of fertilizer in some weeks or months, it is not possible to conduct the survey on every plant soil type combination. Hence there is a need to regularly keep track of the fertilizers used by the farmers and make decisions based on them.

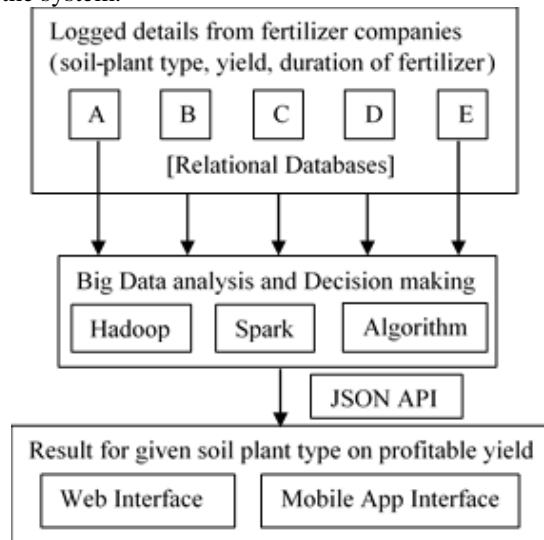
1. Novelty of the Problem:

The selection of fertilizer by the farmer depends upon various factors: (1) regular usage that is being continued from the past years (2) suggestion by the fertilizer dealer or an Agricultural Officer of that region. The type of fertilizer used by the farmer varies from one region to another due to the experience of the people involved in the subject. There is no common data centre that collects data from people belonging to different geographical area in order to make a decision based on the usage. The existing system for deciding the type of fertilizer expects the farmer to test the soil with the help agricultural officer in the region. Based on the results in the laboratory, the most approximate fertilizer is recommended by the officials. When a centralized data centre is established, the experiences of farmers are tracked regularly for a long period of time. The usage to yield ratio of various fertilizers are calculated by the computational model supplied at the technical end and that would result in the most accurate fertilizer prediction than the existing system that is time consuming. The graphical visualization given by the modern Big Data tools help understand the flow of growth over a period of time through proper intuition. Most of the technological tools used for extraction and analysis of data support automated tasks and intelligent decision making. This eliminates the time consuming human thought process that finds difficult to judge the requirements. The algorithm for deciding the proper fertilizer can be changed from time to time with the help advancements in science and agriculture. The efficient algorithm would be the one that uniquely identifies that best suited fertilizer for the given soil and plant type. The usage statistics of fertilizers by farmers bound to geographical region and is not used properly by the existing system. The data points from these statistics help gain more intuitive ideas with the modern data analysis and data extraction tools that are being improved every day. The analysis and estimation details of the soil, crop (or) fertilizer can be used by people from remote area when the results are made public with the help of World Wide Web. This ensures that the fertilizer being used in the farms need not be based on any unclear predictions. The agriculturist can decide the type of fertilizer that is best suited for his land on his own without the help of any inexperienced people.

2. Technical Solution and its Impact:

The fertilizer companies in every region log the type of soil, plant and fertilizer being used by farmers near them. When farmers visit the company for fertilizer, they are given a unique id to identify them on future requests. They are enquired about the type of plant that they used to plant in their field and the type of soil in which they are making production [2]. The past history of fertilizer usage and the duration of utilization are also recorded. Hence, such kind of details extracted from the farmer gives insight into the farming habits of the particular region where the fertilizer company belongs to in the country. These details that are extracted from the farmers at the very basic level are maintained in the relational databases available at the fertilizer companies. The relational databases from every region are periodically synchronized into the centralized database maintained for data extraction, analysis and decision making. The data points on profitable yield received by the farmer in that term plays important role in deciding the suitable fertilizer for any given soil plant type combination. The relational databases are maintained and structured to avoid duplicate data by the same user at one (or) more instances. Multiple entries for the same agriculturist are allowed only when the different combination of soil and plant are proposed (or) only when the quantity of land varies [3]. The data points derived from the inputs of agriculturist are made reliable by the fertilizer companies that record the data. Rather than developing a standalone desktop application for recording the data, web interface is preferred with which the authorized user can input the data from any place into the system. The proper backup of input data is

maintained at the client side and the sever side where decision making is induced. At the decision making end, big data tools and algorithms are used to make better decisions and predict the proper fertilizer suitable for any new agriculturist enrolling in the system.



When an existing agriculturist in the system needs assistance in finding the proper fertilizer for his land but for a different crop than he used to plant, the usage details of an another farmer(s) are taken into account for decision making. Hadoop is used for generating the distributed data warehouse system that can be analyzed through computational instructions. Spark is used for data processing that is collected from the relational databases at companies through synchronization [4]. The derived data are pre-processed as required and supplies as input into the system. The well-defined algorithm for prediction of suitable fertilizer based on profitable yield is executed on the given dataset. The results are stored in the relational database structure for every possible combination and exposed to the outer world through JSON API. With the help of that JSON data, web (or) mobile platform applications are made to reveal the result of processing.

3. Conclusion:

Analyzing the large sets regularly results in returning the sustainable fertilizer to the farmer. Apache hadoop stores large volume of data it helps for knowing the exact fertilizer to the soil, there is a need of processing huge dataset and multiple dynamic parameter needs to be analyzed [5]. The data are synchronized from the client side (fertilizer companies) to the centralized data warehouse for Big Data analytics. The best fertilizer based on yield rate are being researched that fits exactly for the problem.

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