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Meta Analysis: An Effective Data Analysis Technique

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ABSTRACT: Analysis of the data collected to perform a task is mostly done with traditional Quantitative or Qualitative methods. These methods are not sufficient for data analysis today as nature of data is changing as well as volume of data has increased tremendously. This has changed the nature of expected findings. Meta Analysis is a data analysis technique which is useful in this changing scenario. It analyzes results obtained through previously analyzed data and hence can identify similarities / differences in the previous work to get a holistic view resulting in better conclusions.

KEYWORDS: Data, Data Analysis, Meta Data, Meta Analysis.

I. INTRODUCTION

This century is witnessing ease of availability of data in extremely large volume for anything. This has mainly happened due to the widespread of internet which has brought this voluminous data in public domain for further usage.

II. NEED OF DATA ANALYSIS

The data which is collected to perform a desired task can be raw which may be incomplete in some sense or may contain unwanted information or may contain some errors. Thus this raw data needs to be preprocessed in order to get clean data for processing. Though the data is clean it may not result in any conclusion related to the task due to its nature. However, this data can give very fruitful results if analyzed properly. The nature of the data determines the method / technique to use for analyzing the data. This paper will be discussing a few commonly used data analysis techniques with a special focus on Meta Analysis.

III. DATA ANALYSIS TECHNIQUES

As stated before the data analysis techniques depend on the data on which they are to be applied, these techniques are discussed here accordingly.

A. QUANTITATIVE DATA ANALYSIS

The data is measurable here and also the measurement is precise. The commonly used techniques include measure of central tendency, means comparison, frequency distribution, correlation or cross tabulations. Though these techniques can provide considerably accurate results, they are mainly designed to provide summaries which can be used for generalization.[7]

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B. QUALITATIVE DATA ANALYSIS

The qualitative data is not in measurable form. Mostly it is in textual form. Qualitative data analysis involves the identification, examination, and interpretation of patterns in textual data to determine how these patterns will be useful in completing the task. [6] Data mining techniques are very useful here. The conclusions obtained here may not be concrete.[6]

Both these techniques stated above are having their own limitations. The Bias observed here could be significant. Also these techniques may not be applicable when the data is heterogeneous or voluminous. There are many difficulties in processing Big Data such as capturing, storing, and searching and in analysis as well.

Use of Meta-Data or Meta-Analysis can be helpful then.

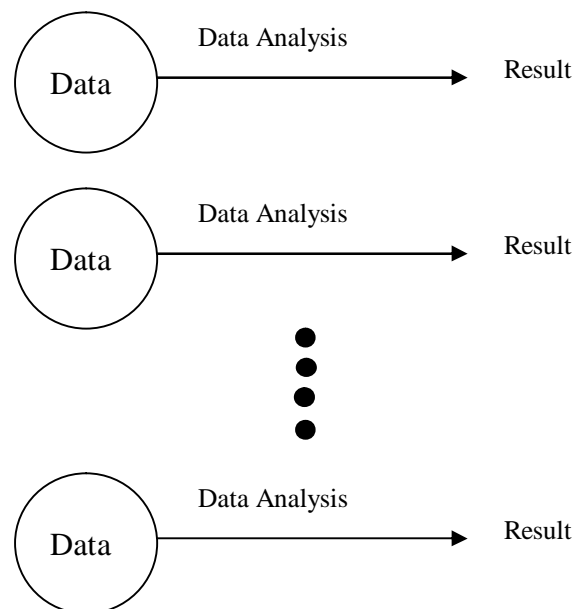


Fig. 1. Traditional Data Analysis

META DATA

Meta Data gives complete information about the original (primary) data in a very concise form. It is naturally very compact and hence can be easily analyzed further for getting fruitful conclusions about the given task. Analysis of Meta Data / Meta Analysis is very useful when raw data is heterogeneous or voluminous.

META ANALYSIS

Meta-analysis is the statistical procedure for combining data from multiple studies.[1] Meta-analysis is preferred to identify common effects when the results obtained through multiple tasks are quite consistent as well as for results which are not consistent to find out the reasons for the variations.[1]

Meta Analysis technique analyzes the previously analyzed data, that is, it analyzes the results which were obtained by analyzing the data of a specific task. Meta Analysis can also be used for combining quantitative results obtained from multiple tasks of similar nature to obtain an overall summary / knowledge. It can also be used to analyze the trends / similarities or the variations / differences across the similar tasks. This makes it possible to get a holistic view of the results of multiple tasks which use different measures for similar data or produce results in different ways. This leads to minimization of Bias.[1]

Meta Analysis is having a wide spread area of applications. Pharmaceutical companies use meta-analysis to gain approval for new drugs as part of the approval process. It can also be used in the fields of medicine, genetics,



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education, psychology, criminal justice, sociology, social psychology, finance and economics, political science, marketing, ecology and many more.[8]

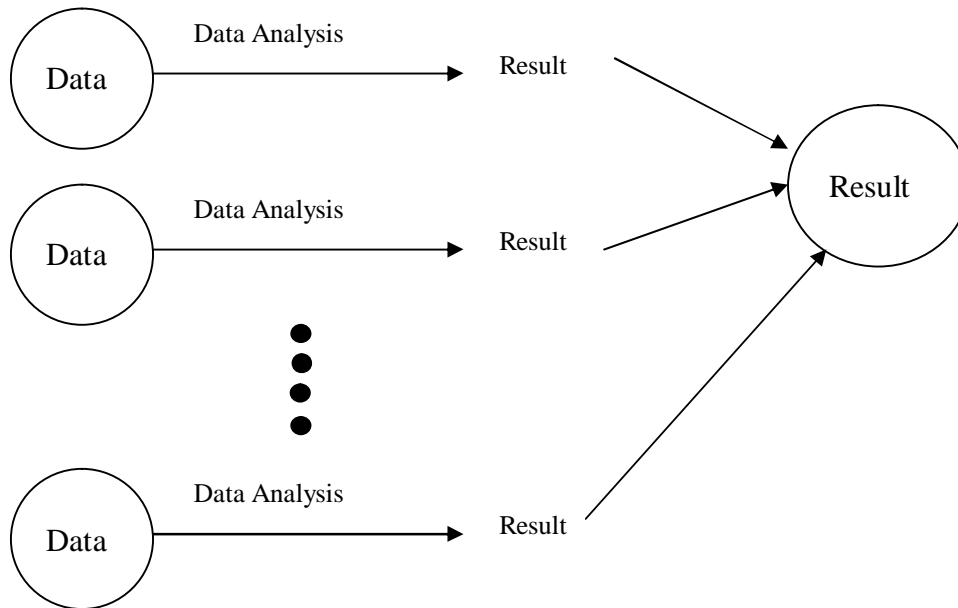


Fig. 2. Meta Analysis

IV. CONCLUSION

Meta Data and Meta Analysis are useful data analytic techniques when data is voluminous and heterogeneous in nature.

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