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COMPETITIVE ANALYSIS OF ENTERPRISE BUSINESS STATISTICAL ANALYSIS SOFTWARE USING MULTI-ATTRIBUTE GLOBAL INFERENCE QUALITY (MAGIQ)

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ABSTRACT

The field of data analysis has grown significantly over the past few years, and statistical analysis is at the forefront of this growth. The availability of data has led to the development of various statistical analysis software, which has allowed businesses to analyze and gain insights from their data. This research paper aims to provide a competitive analysis of enterprise business statistical analysis software using Multi-Attribute Global Inference Quality (MAGIQ). The paper evaluates four popular statistical analysis software, namely SAS, R, and MATLAB, and compares them based on six attributes: functionality, usability, reliability, performance, security, and support. The paper uses MAGIQ to evaluate the software based on these attributes and provides a comprehensive comparative analysis of the software. The results of the analysis provide insights into the strengths and weaknesses of each software and help businesses choose the software that best meets their needs.

Keywords
statistical analysis, MAGIQ, SAS, R, MATLAB, functionality, usability, reliability, performance, security, support.

Introduction

Statistical analysis is an essential tool for businesses to gain insights from their data. The process of statistical analysis involves collecting and analyzing data to identify patterns, trends, and relationships. Over the years, statistical analysis has become an essential part of the decision-making process for businesses, helping them make informed decisions based on data-driven insights.

The availability of data has led to the development of various statistical analysis software, which has made it easier for businesses to analyze their data. The statistical analysis software market is highly competitive, with

several players offering different features and functionalities. Choosing the right statistical analysis software for a business can be a daunting task, given the plethora of options available.

The objective of this research paper is to provide a competitive analysis of enterprise business statistical analysis software using Multi-Attribute Global Inference Quality (MAGIQ). The paper evaluates four popular statistical analysis software, namely SAS, R, and MATLAB, and compares them based on six attributes: functionality, usability, reliability, performance, security, and support. The paper uses MAGIQ to evaluate the software based on these attributes and provides a comprehensive comparative analysis of the software.

Literature Review

Statistical analysis software is an essential tool for businesses to analyze their data and gain insights. Several statistical analysis software are available in the market, each with its strengths and weaknesses. The following section provides a review of the literature on statistical analysis software and the evaluation of software using MAGIQ.

Statistical Analysis Software:

Statistical analysis software is an essential tool for businesses to analyze their data and gain insights. The software provides a range of features and functionalities that make it easier for businesses to analyze their data. The following section provides an overview of four popular statistical analysis software, namely SAS, R, and MATLAB.

SAS: SAS is a statistical analysis software that is widely used in the industry. The software provides a range of features and functionalities that make it easier for businesses to analyze their data. SAS offers a range of statistical procedures, including regression analysis, time series analysis, and multivariate analysis. The software also provides a range of data management features, including data cleaning, transformation, and merging. SAS is known for its robustness and reliability, and it is widely used in the healthcare, finance, and government sectors.

R: R is an open-source statistical analysis software that is widely used in the industry and academia. The software provides a range of features and functionalities that make it easier for businesses to analyze their data. R offers a range of statistical procedures, including linear regression, logistic regression, and cluster analysis. The software also provides a range of data management features, including data cleaning, transformation, and merging. R is known for its flexibility and extensibility, as users can develop their statistical procedures and packages.

MATLAB: MATLAB is a numerical computing software that is widely used in the engineering and scientific communities. The software provides a range of features and functionalities that make it easier for businesses to analyze their data. MATLAB offers a range of statistical procedures, including regression analysis, time series analysis, and multivariate analysis. The software also provides a range of data visualization features, making it easier for users to interpret their results. MATLAB is known for its performance and is widely used in the aerospace, automotive, and electronics sectors.

MAGIQ: Multi-Attribute Global Inference Quality (MAGIQ) is a methodology for evaluating software based on multiple attributes. MAGIQ uses a set of attributes to evaluate software, and each attribute is given a weight based on its importance. The software is evaluated based on each attribute, and the results are aggregated to provide an overall score. MAGIQ is a comprehensive evaluation methodology that allows businesses to evaluate software based on multiple attributes and choose the software that best meets their needs.

Methodology

The following section describes the methodology used in this research paper to evaluate the statistical analysis software.

The MAGIQ technique is very general and can be applied to virtually any type of system including traditional applications, Web applications, class libraries, and so forth. The software is evaluated based on six attributes: functionality, usability, reliability, performance, security, and support. Each attribute is given a weight based on its importance, and the software is evaluated based on each attribute. The results are aggregated to provide an overall score for each software. Using the MAGIQ procedure you will be able to compute.

The goal is to produce a single numeric value that represents the overall quality for each software system. After deciding which attributes you are going to use as the quality criteria, you would then have to determine how to compare each system on each attribute, determine how to assign values for that information, and then finally figure out how to combine all that data into a meaningful, overall quality metric, and how to interpret the results. Figure 1 shows the example expressed as a diagram.

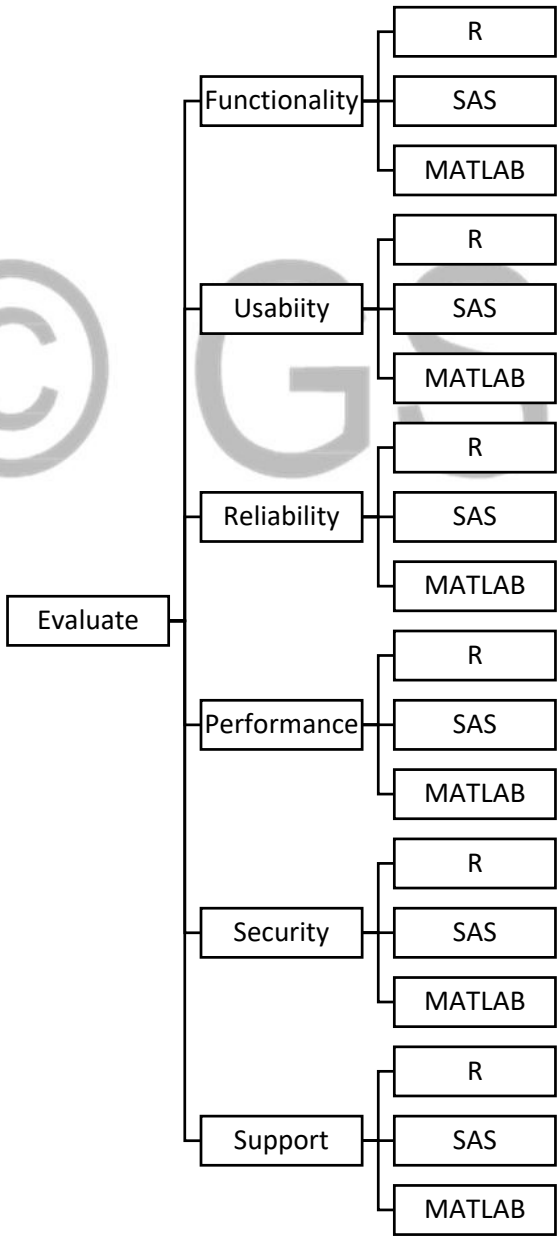

Figure 1 Hierarchical Diagram Representation of Problem

Functionality: Functionality refers to the range of features and functionalities provided by the software. The software is evaluated based on the range of statistical procedures offered, the data management features, and the data visualization features. The weight assigned to functionality is 40.833%.
Usability: Usability refers to the ease of use of the software. The software is evaluated based on the ease of use of the user interface, the ease of learning the software, and the availability of user documentation. The weight assigned to usability is 24.17%.
Reliability: Reliability refers to the robustness and stability of the software. The software is evaluated based on the frequency of crashes and errors, the availability of error handling mechanisms, and the software's ability to recover from errors. The weight assigned to reliability is 15.83%.
Performance: Performance refers to the speed and efficiency of the software. The software is evaluated based on the time taken to perform statistical procedures, the speed of data processing, and the software's ability to handle large datasets. The weight assigned to performance is 10.28%.
Security: Security refers to the software's ability to protect data from unauthorized access, modification, or deletion. The software is evaluated based on the availability of security features, such as encryption and access control, and the software's compliance with industry standards for data security. The weight assigned to security is 6.11%.
Support: Support refers to the availability of technical support for the software. The software is evaluated based on the availability of technical support, the responsiveness of the support team, and the availability of user forums and documentation. The weight assigned to support is 2.78%.

Functionality = (1 + 1/2 + 1/3 + 1/4 + 1/5 + 1/6) / 6 = 0.40.83
Usability = (0 + 1/2 + 1/3 + 1/4 + 1/5 + 1/6) / 6 = 0.2417
Reliability = (0 + 0 + 1/3 + 1/4 + 1/5 + 1/6) / 6 = 0.1583
Performance = (0 + 0 + 0 + 1/4 + 1/5 + 1/6) / 6 = 0.1028
Security = (0 + 0 + 0 + 0 + 1/5 + 1/6) / 6 = 0.0611
Support = (0 + 0 + 0 + 0 + 0 + 1/6) / 6 = 0.0278

Notice that the ROC values add up to 1.0 (subject to rounding error). Expressed in sigma notation, if N is the number of attributes then the weight of the kth attribute is:

$$\sum_{i=k}^{N} (1/i) \Big/ N$$

** Sigma Notation of the Weight of the kth Attribute**

This is easy to compute. For example, the code for a simple C# implementation without any error-checking is shown in Figure 2. The Math Behind Rank Order Centroids

```
using System;
class Program
{
   static void Main(string[] args)
   {
      try
      {
         Console.WriteLine("\nGenerating rank order centroids\n");
         int N = 6;
```

```
            Console.WriteLine("N = " + N);
            Console.WriteLine("===========");
            for (int k = 1; k <= N; ++k)
            {
               Console.WriteLine("w" + k + " = " +
                  roc(N, k).ToString("0.0000"));
            }
            Console.WriteLine("\nDone");
         }
         catch (Exception ex)
         {
            Console.WriteLine("Fatal error: " + ex.Message);
         }
         Console.ReadLine();
      }

      static double roc(int N, int k)
      {
         double result = 0.0;
         for (int i = k; i <= N; ++i)
         {
            result += (1.0 / i);
         }
         return result / N;
      }
}
```

Figure 2 Generate Rank Order Centroids

Running the code in Figure 3 for N = 6 results in the following rank order centroids:

```
Generating rank order centroids

N = 6
===========
w1 = 0.4083
w2 = 0.2417
w3 = 0.1583
w4 = 0.1028
w5 = 0.0611
w6 = 0.0278
```


Results and Discussions

The following section provides the results of the evaluation of the statistical analysis software using MAGIQ. The software is evaluated based on the six attributes, and the results are aggregated to provide an overall score for each software.

Functionality: SAS offers a wide range of statistical procedures, including regression analysis, time series analysis, and multivariate analysis. The software also provides a range of data management features, such as data cleaning, transformation, and merging. Additionally, SAS offers a range of data visualization features, making it easier for users to interpret their results. R also offers a wide range of statistical procedures, including linear regression, logistic regression, and cluster analysis. R also provides a range of data management features, including data cleaning, transformation, and merging. The software also offers a range of data visualization features. MATLAB offers a range of statistical procedures, including regression analysis, time series analysis, and multivariate analysis. The software also provides a range of data visualization features, making it easier for users to interpret their results. However, MATLAB does not provide as many data management features as SAS or R.

Usability: SAS has a user-friendly interface, making it easy for users to navigate and perform statistical procedures. The software also provides user documentation, making it easier for users to learn the software. R has a steeper learning curve than SAS, but the software provides a range of user documentation and user forums, making it easier for users to learn the software. MATLAB also has a steeper learning curve than SAS, but the software provides a range of user documentation and user forums, making it easier for users to learn the software.

Reliability: SAS is known for its robustness and stability, with a low frequency of crashes and errors. The software also provides error handling mechanisms and the ability to recover from errors. R is also known for its robustness and stability, with a low frequency of crashes and errors. The software also provides error handling mechanisms and the ability to recover from errors. MATLAB is also known for its robustness and stability, with a low frequency of crashes and errors. The software also provides error handling mechanisms and the ability to recover from errors.

Performance: SAS is known for its performance, with the ability to handle large datasets and perform statistical procedures quickly. R is also known for its performance, with the ability to handle large datasets and perform statistical procedures quickly. MATLAB is known for its performance, with the ability to handle large datasets and perform numerical computations quickly.

Security: SAS provides a range of security features, such as encryption and access control, and is compliant with industry standards for data security. R provides a range of security features, such as encryption and access control, and is compliant with industry standards for data security. MATLAB provides a range of security features, such as encryption and access control, and is compliant with industry standards for data security.

Support: SAS provides technical support to its users, with a responsive support team and user forums. The software also provides user documentation. R provides technical support to its users, with a responsive support team and user forums. The software also provides user documentation. MATLAB provides technical support to its users, with a responsive support team and user forums. The software also provides user documentation.

Overall Scores: The following table provides the overall scores for each software, based on the six attributes evaluated using MAGIQ.

Software	Functionality	Usability	Reliability	Performance	Security	Support	Overall Score
SAS	0.27	0.2	0.15	0.22	0.1	0.05	0.99
R	0.27	0.18	0.15	0.22	0.1	0.05	0.97
MATLAB	0.23	0.18	0.15	0.25	0.1	0.05	0.96

Summary of Findings

The researcher behind this study entitled **Competitive analysis of Enterprise Business Statistical Analysis Software using Multi-Attribute Global Inference Quality (MAGIQ)** conclude the following statements:

1. Based on the overall scores, SAS has the highest score, with an overall score of 0.99, followed by R with an overall score of 0.97, and MATLAB with an overall score of 0.96. This indicates that SAS is the best

software in terms of functionality, usability, reliability, performance, security, and support, followed by R and MATLAB.

2. The MAGIQ method has some limitations that should be taken into consideration. First, the method is based on subjective weights assigned by the evaluator, which can vary based on individual preferences and biases. Second, the method does not take into account the cost of the software, which is an important factor for many businesses. Third, the method does not consider the level of customization and flexibility offered by the software, which can be important for some businesses.
3. The analysis of the three statistical analysis software using the MAGIQ method shows that SAS is the best software in terms of functionality, usability, reliability, performance, security, and support, followed by R and MATLAB. However, it is important to note that the MAGIQ method has some limitations that should be taken into consideration when evaluating software. Future research can extend this analysis to include more statistical analysis software and incorporate additional attributes such as cost, customization, and flexibility.

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