

Innovate with SAS & its Components: A Survey

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Abstract— SAS is making a difference in people's lives all around the world. This analytics software helps organizations make the kinds of important decisions that drive change each and every day – like ensure that people who struggle to learn are not lost. The work we do makes a difference, and the way we live matters – both on and off the job, so SAS takes a total rewards approach that provides both financial and feel-good benefits. SAS (Statistical Analysis System) is a software developed by SAS Institute for advanced analytics, multivariate analyses, business intelligence, data management, and predictive analytics. This is a software which provide tremendous power and ease of work. SAS is a software i.e. so easy that will spark your creativity with analytics and will inspired you to take a new look at your data. This survey paper aims to provide basic information regarding statistical analysis system including basic components of SAS such as Base SAS, Big data management: data integration, Business intelligence, Clinical SAS etc.

Key words: Statistical Analysis System, Base SAS, Business Intelligence, Big Data Analytics, Clinical SAS

I. INTRODUCTION

A. *Introducing SAS Software [1]*

People often ask what SAS stands for. Originally the letters S-A-S stood for Statistical Analysis System. SAS products have become so diverse that a few years back SAS officially dropped the name Statistical Analysis System, now outgrown, and became simply SAS.

B. *What is Statistical Analysis System?*

SAS (Statistical Analysis System) was developed by James Goodnight. In 1970-it was Package and in 1980-it was Language and in 1990-it finally turned into Software. It's the science of collecting, exploring and presenting large amounts of data to discover underlying patterns and trends. Statistics are applied every day – in research, industry and government – to become more scientific about decisions that need to be made. For example:

- Communication companies use statistics to optimize network resources, improve service and reduce customer churn by gaining greater insight into subscriber requirements.
- Government agencies around the world rely on statistics for a clear understanding of their countries, their businesses and their people.

Look around you. From the tube of toothpaste in your bathroom to the planes flying overhead, you see hundreds of products and processes every day that have been improved through the use of statistics.

Basically, SAS is a software solutions that enables you to perform the following tasks: data entry, retrieval, and management report writing and graphics design statistical and mathematical analysis, business forecasting and decision

support applications development. SAS can be used in the following domain such as clinical research, banking, insurance etc.

C. *SAS Products [1]*

In the new century, SAS has continued to grow with products for cleansing messy data, and analyzing genetic data. While SAS has a diverse family of products, most of these products are integrated; that is, they can be put together like building blocks to construct a seamless system. For example, you might use SAS/ACCESS software to read data stored in an external database such as Oracle, analyze it using SAS/ETS software (business planning, forecasting, and decision support), and then forward the results in e-mail messages to your colleagues, all in a single computer program.

D. *SAS Operating Environment [1]*

SAS software runs in a wide range of operating environments.

You can take a program written on a personal computer and run it on a mainframe after changing only the file-handling statements specific to each operating environment. And because SAS programs are as portable as possible, SAS programmers are as portable as possible too. If you know SAS in one operating environment, you can switch to another operating environment without having to relearn SAS.

II. SAS TERMINOLOGY

SAS is a software that can mine, alter, manage and retrieve data from a variety of sources and perform statistical analysis on it. SAS provides a graphical point-and-click user interface for non-technical users and more advanced options through the SAS language. The SAS software has more than 200 components. Some of the SAS components include:

- Base SAS – Basic procedures and data management
- SAS/STAT – Statistical analysis
- SAS/GRAPH – Graphics and presentation
- SAS/OR – Operations research
- SAS/ETS – Econometrics and Time Series Analysis
- SAS/IML – Interactive matrix language
- SAS/AF – Applications facility
- SAS/QC – Quality control
- SAS/INSIGHT – Data mining
- SAS/PH – Clinical trial analysis
- Enterprise Miner – data mining
- Enterprise Guide - GUI based code editor & project manager
- SAS EBI - Suite of Business Intelligence Applications
- SAS Grid Manager - Manager of SAS grid computing environment

III. SOME BASIC COMPONENTS OF SAS



Fig. 1: Components of SAS

A. Base SAS – Basic Procedures and Data Management [3]

1) What does Base SAS Software do?

Base SAS is a fourth-generation programming language (4GL) for data access, data transformation, analysis and reporting. It is included with the SAS Platform. Base SAS is designed for foundational data manipulation, information storage and retrieval, descriptive statistics and report writing. It also includes a powerful macro facility that reduces programming time and maintenance headaches.

2) Why is Base SAS Software Important?

Base SAS runs on all major operating systems. It significantly reduces programming and maintenance time, while enabling your IT organization to produce the analyses and reports that decision makers need in the format they prefer.

3) Who uses Base SAS?

Base SAS is used by SAS programming experts and power users who prefer to code to manipulate data, produce and distribute ad hoc queries and reports, and/or interpret the results of descriptive data analysis.

4) Key Benefits of base SAS.

- Integrate data across environments.
- Provide a single view of your data.
- Read, format and analyze any data. From small data issues to large and complex data problems, programmers can quickly read, format and report on data in any format.
- Make programming fast and easy.
- Base SAS provides maximum reporting flexibility.
- Incorporate Hadoop capabilities into SAS applications. Using Base SAS, you can not only incorporate Hadoop capabilities such as the Pig and Hive languages and MapReduce framework, you can also apply them across all SAS products and solutions.
- Access industry-standard data security. Advanced Encryption Standard (AES), allows you to encrypt SAS data on disks.

B. SAS Business Intelligence [4]

1) What does Business Intelligence do?

Business intelligence systems combine operational data with analytical tools to present complex and competitive information to planners and decision makers. The objective is to improve the timeliness and quality of inputs to the decision process.

2) Why is Business Intelligence Important?

Business Intelligence is used to understand the capabilities available in the firm; the state of the art, trends, and future directions in the markets, the technologies, and the regulatory environment in which the firm competes; and the actions of competitors and the implications of these actions. The emergence of the data warehouse as a repository, advances in data cleansing, increased capabilities of hardware and software, and the emergence of the web architecture all combine to create a richer business intelligence environment than was available previously.

3) Who uses Business Intelligence?

Business intelligence is used by decision makers throughout the firm. At senior managerial levels, it is the input to strategic and tactical decisions. At lower managerial levels, it helps individuals to do their day-to-day job. In some firms, business intelligence capabilities are rolled out to most of its professionals (i.e., 'BI for the masses')

4) Key Benefits of Business Intelligence Applications.

- Actionable Intelligence is a big reason why BI is gaining so much ground is its ability to provide actionable intelligence.
- Information Integration which provides much more accurate forecasts.
- Sales Personalization is the contribution that business intelligence makes to the overall success of an enterprise cannot be overstated in today's digital economy.
- Creating forecasts based on historical data, past and current performance, and estimates of the direction in which the future will go.

C. Clinical SAS [3]

1) What does Clinical SAS do?

SAS Clinical Data Integration helps you organize, standardize and manage clinical research data and metadata. It brings repeatability and automation to the process of transforming, managing and verifying the creation of industry mandated data standards.

2) Why is Clinical SAS Data Integration Important?

It facilitates operational efficiencies that enable rapid business insight from strategic clinical information. You can define analysis data sets and deliver cleaner, more standard data for analysis. It provides the foundation needed to effectively deliver strategic analyses, such as safety and efficacy analysis and cross-study analysis.

3) Who uses Clinical SAS?

It is designed for clinical research professionals who need to improve efficiency, quality and speed during the collection, management, analysis, reporting and assessment of clinical trials data and information.

4) Key Benefits of Clinical SAS.

- Increase operational efficiency while lowering costs.
- Speed data preparation for medical publications.
- Support and automate data aggregation and standardization for ongoing clinical trials.
- Ensure the proper use of standards.
- Improve productivity which helps in building and documenting work with a user-friendly GUI.
- Prepares Uniform, Consistent Data for Analysis.

D. Big Data Analytics [3] [5]

1) What does Big Data do?

Big data is a term that describes the large volume of data – both structured and unstructured – that inundates a business on a day-to-day basis. But it's not the amount of data that's important. It's what organizations do with the data that matters. Big data can be analyzed for insights that lead to better decisions and strategic business moves. Big data used to be a technical problem. Now it's a business opportunity. Big data is not just big. It's also diverse data types and streaming data. Big data analytics is where advanced analytic techniques operate on big data sets. Hence, big data analytics is really about two things—big data and analytics—plus how the two have teamed up to create one of the most profound trends in business intelligence (BI) today.

2) Why Is Big Data Important?

The importance of big data doesn't revolve around how much data you have, but what you do with it. You can take data from any source and analyze it to find answers that enable cost reductions, time reductions, new product development and optimized offerings, and smart decision making. When you combine big data with high-powered analytics, you can accomplish business-related tasks such as:

- Determining root causes of failures, issues and defects in near-real time.
- Generating coupons at the point of sale based on the customer's buying habits.
- Recalculating entire risk portfolios in minutes.
- Detecting fraudulent behaviour before it affects your organization.

3) Who uses Big Data?

Big data affects organizations across practically every industry such as Banking, Education, Government, Health care, Manufacturing and Retail.

4) Key Benefits of Big Data.

- Big Data is Timely – 60% of each workday, knowledge.
- Big Data is Relevant – 43% of companies are dissatisfied with their tools ability to filter out irrelevant data. Something as simple as filtering customers from your web analytics can provide a ton of insight into your acquisition efforts.
- Big Data is Secure – The average data security breach costs \$214 per customer. The secure infrastructures being built by big data hosting and technology partners can save the average company 1.6% of annual revenues.
- Big Data is Authoritative – 80% of organizations struggle with multiple versions of the truth depending on the source of their data. By combining multiple, vetted sources, more companies can produce highly accurate intelligence sources.
- Big Data is Actionable – Outdated or bad data results in 46% of companies making bad decisions that can cost billions.
- Analytics, social analytics, CRMs, A/B Testing tools, email marketing systems, and more... each with focus on its silo.
- Big Data is Trustworthy – 29% of companies measure the monetary cost of poor data quality. Things as simple as monitoring multiple systems for customer contact information updates can save millions of dollars.

- Big Data is Holistic – Information is currently kept in silos within the organization. Marketing data, for example, might be found in web analytics, mobile
- Big Data is Accessible – Half of senior executives report that accessing the right data is difficult. Workers spend attempting to find and manage data.

IV. CONCLUSION

The goal of this paper was to provide an introduction to SAS as a software by highlighting some its basic components. While statisticians and programmers each tend to have areas of respective strengths, weaknesses and preferred tools, each group is strongly encouraged to explore and use the components available in SAS, both simple and complex. We also discussed the users of that particular components and significance of it in analytic approaches to deal with statistical systems. The paper also discussed in detail the key feature of each components. In conclusion, with the incorporation of these survey based software in SAS, analysts look forward to greater ease in selecting when dealing with complex sample designs.

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