Introduction

Many companies have existing information systems that collect large amounts of data about their business and are used to produce reports with that information. The systems referred to are those that have evolved over time as the company has grown and its information needs have grown. The systems serve as repositories of business transactions which are used to produce either lists of customers and/or reports about the current status for those customers. The problem to be addressed here is that many times these reports get to be so voluminous that the system becomes too cumbersome to serve the reporting needs of the company.

Hypothesis

Because the volume, complexity and volatility of the information needed to manage many of today's companies is so great, systems must be designed to produce a manageable volume of information---to indicate where people who understand and operate the business should focus their attention.

The SAS System can serve as an excellent tool to produce small-volume reports to indicate where to focus attention to achieve the highest return for effort expended. The SAS System can also be used to perform more in-depth investigations to both increase the understanding of potential markets and help focus company resources on the issues for reaching those markets.

Discussion

An information system that serves its user-community well should routinely produce report(s) representing the following three types of information-gathering actions:

1. Validate - Data should be produced that can be easily reviewed to assure the user community that a new update was valid. This information should take the form of totals or averages that can be quickly reviewed to assure the user community that new data added to the system were correct.

2. Indicate trends - Data that indicate trends in values that are important to the company's business for major groupings of customers. In other words, these reports should show what is going on for meaningful groups such as territories, regions, customers-types.

3. Point out exceptions - Final series of data should indicate either exceptions to norms or situations that exceed well defined (but modifiable) values.

Information systems should not produce listings of all transactions. The volume is usually too great and the individual numbers are usually only meaningful to staff who know the individual situations personally.

If these reports are well-designed, they should cause the reader to ask a set of well-defined questions or at least ask for a finite amount of additional information which should explain the aberrances seen in the previous reports. Some of these questions can only be answered by contacting the customer and the system has served a valuable purpose by directing the user to interview the right people.

In general terms, what should happen is that after reviewing a series of reports that present the indicated information, the reader (or his staff) should make use of additional resources (like an information center) to answer questions that arise from reviewing the data. For example: staff should be able to ask questions to determine what has changed at a company in question or maybe to start a short term special study focused on a perceived problem area to track patterns over time. Special studies should also be well directed and with specific time periods defined, or system users may perform historical studies to determine what led up to the change that was seen (to determine predictors for future exception or trend reports).

Methods Used

Validation Reports

These reports are designed to present the three types of data specified above for meaningful reporting categories and the SAS System is well suited for the production of these reports. The validation data should include numbers like the sum, mean, and the median of values for the reporting basis groups (i.e. an area, line of business, etc. used for reporting). While totals are useful, it is
difficult to understand small changes to large numbers. The mean can be used to understand what is happening to the individual customer and the median given a similar perspective, only excluding the extreme cases which can skew averages. While these are not rigorous interpretations of these values they are usually easily understood and ensure that new data added to a system was valid.

To give the reader of these reports an understanding of how variable the reporting group is, the report should include some percentiles which show the distribution of values above and below the mean value given. One can look at numbers like the 10th, 25th, 75th, and 90th percentiles as well as the high and low values and see the range and distribution of values for the reporting group. In addition, an analysis of variance can be included to give readers an appreciation of how variable the input data were for the reporting group.

This small set of values, when calculated for each reporting group and across the reporting groups, can give the information system user both an appreciation for the validity of the new data as well as an understanding of what is going on in the market. And such reports can be used in a wide variety of additional ways.

All of the values needed to produce a report such as this can easily be calculated using the base SAS software - PROC UNIVARIATE.

Trend Analysis

A trend analysis is designed to show users of these systems what is happening to their market over time and as such can be a summary of the validation data over time. For example, a very useful report is to graph the means from the validation reports (over time) with a regression line shown to smooth the data.

A review of this type of information for reporting groups or possibly even more aggregated groups can give users an excellent appreciation for trends in their market place.

Exception Reports

The exception report is a list of customers who have either changed their value for some variable (over time) by more than a specified amount, or whose value for a variable exceeds a specified threshold. While it is true that this report in a list, it should be kept to a minimum by setting the thresholds for inclusion so that only those customers who require immediate attention are included.

Production Methods

One who is familiar with the SAS System will already have seen that all of these reports can be produced readily with base SAS software PROCs. A summary follows:

Validation Reports - a report of this type can be produced with the base SAS software PROC - UNIVARIATE. The output of this proc yields a large amount of information about the new data added to the system. A subset of this information can be output for formatted printing with PROC PRINT utilizing titles, labels and formats to enhance the readability of the report and to minimize the data presented.

Trend Reports - these reports can be generated by processing either the data from a series of the validation reports to produce graphs with SAS/GRAPH, or one could decide to utilize the source data system to generate the input file.

Exception Reports - the threshold reports can most easily be produced with the information fed to the Validation Reports by doing a DATA step to produce a subset of the input data for records that exhibit values above (or below) the thresholds established.

Conclusion

This paper has described an alternative design to be used for corporate reporting systems—a minimal set of reports that direct the user's attention to an analysis of the data, not a reporting of the data.

While it is true that a certain amount of statistical background is necessary for most user communities to be comfortable with the meaning of the statistics presented, the effort will be repaid with increased efficiency and productivity.

This reporting methodology is heavily dependent on the SAS System for several reasons:

1. the expense to generate the required code is minimal;
2. The reliability of the code generated is extremely high, especially considering the complexity of some of the calculations performed and

3. The reports may be revised without great expense; The alternative to not using this methodology for system design is a heavy reliance on staff to review large sets of reports to determine where and how resources should be expended.

The proposed methodology allows senior staff to have high-level information by reviewing a minimal set of reports. They have the information necessary to ask well-defined and informed questions as needed to more fully understand their business and market. The types of reports suggested can also have the effect of enhancing peoples' ability to utilize either information centers or MIS type systems because they can begin an inquiry session with a set of discrete questions to answer.

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