ABSTRACT

The pharmaceutical industry is well known for using SAS to perform quantitative analysis for clinical research. Lately, however, competitive pressures have created opportunities in the marketing departments to use SAS for Data Mining. Applications such as sales force planning and direct marketing to doctors and consumers are employing many new SAS tools and techniques. This paper will provide an overview and examples of some of these Data Mining SAS applications in the pharmaceutical industry.

INTRODUCTION

Data mining techniques lend themselves quite well to a variety of critical business decisions in the pharmaceutical industry. On the commercial side these include forecasting production schedules for the manufacturing plants, determining market potential in critical go/no decisions on continuing work on developmental compounds, or making financial projections for stock holders and investors on Wall Street.

WHAT IS DATA MINING?

Data mining is a new term for what many analysts working in the field of sales and marketing analytics have been doing for years. It covers a broad range of techniques and methodologies and incorporates many tools to discover patterns and relationships in data. Data mining is usually associated with large amounts of data that is often housed in a data warehouse.

There are five basic data mining tasks: profiling, clustering, classification, prediction, decision analysis.

Profiling has the goal of defining characteristics about a certain population. It can involve segmenting a population into distinct groups to assist with marketing or analysis. It is a good first step when dealing with a complex database.

Classification consists of examining characteristics of a record or field for assignment to a well-defined segment. An example of this might be to place a doctor in a group based on whether he brings in low, medium or high sales.

Clustering is finding similar groups within a population. There is not any purpose in the groups except to find similarities between the members. Certain drugs may fall into clusters based on their purpose or the types of disease they treat.

Prediction uses past behavior to predict future behavior. For example, doctors may be scored based on their likelihood of ending up in a low, medium or high sales group. This is calculated based on past behaviors or characteristics that are correlated with subsequent sales. Similar techniques can be used to predict sales in dollars.

Decision Analysis uses a combination of classification and prediction to determine an optimal action. It is an excellent tool for weighing risk and benefit.

WHAT DATA MINING CAN DO

Data mining can allow you to know your data. It can help you make better decisions and design more effective programs with improved targeting. And finally, it can uncover problems in your data.

WHAT DATA MINING CAN’T DO

Data mining cannot define your marketing objective or explain why an outcome occurs. It cannot correct problems in your data. And it cannot promise perfect results.

HOW DATA MINING DIFFERS FROM MARKET RESEARCH

Market research has historically involved smaller, more personal data collection methods such as focus groups and surveys. These methods are often used to develop products and design marketing campaigns. Today, market research is being used to enhance and validate larger databases that can be used for data mining. When information is gathered from a survey or focus group, it is segmented or modeled using characteristics that are common to both the survey data and the larger database. It is then appended to the larger database. It is often tested on the larger group before a full scale campaign is executed. This is important because actual behavior does not always follow intended behavior.

SALES AND MARKETING

The pharmaceutical industry spends billions of dollars a year in promotion. It is generally estimated that it costs between $100 and $150 each time a sales representative sets foot in a doctor’s office --- before buying lunch for the office staff. IMS Health suggested recently that through the first eleven months of 1998, the industry had spent a total of $1.2 billion on direct-to-consumer (DTC) advertising alone. Expenditures of this magnitude demand effective management of resources and optimal promotion of one’s product portfolio. Insistence on evaluating the effectiveness of these expenditures is likely at budget time. Contractual
obligations may also require this where payments to outside partners or vendors are performance-based. Finally, it can provide valuable feedback in designing the promotional campaign for the next year.

a) Market Segmentation

One of the tools employed in the pharmaceutical industry is the use of micro marketing strategies. With sufficient data on one's customers, they can be divided into groups with promotions specifically-tailored to each individual segment. Thus, the most effective message is employed for each audience, with each dollar being spent where its return is likely to be highest. These data can include prescribing information at an SMSA-level, at a zip code-level, or at a doctor level. Supplemented by survey data, patient and physician interviews, information gleaned from epidemiological studies and managed care organizations, questionnaires on web sites, and other market research, a quite detailed picture of a customer base can be identified, with marketing strategies devised accordingly.

b) Measuring ROI

Measuring a given program's success --- the change in sales realized for each dollar spent in promotion --- can be difficult. Any one program occurs in the context of an entire complement of programs, whether its sales force detailing, formal educational programs, dinner and group meetings, conferences and conventions, product sampling, mass mailings, journal adds, script pads, a variety of DTC efforts, or a grab bag of chachki handouts (pens, bags, clothing, golf balls, and the like). Add to this the confounding effect of the combined efforts within one company to support its entire product line --- not always perfectly coordinated. Finally, one's competitors are also out promoting their products, sometimes oblivious to other companies' promotional strategies, but other times explicitly seeking to counter the competitor's programs.

What is the Solution?

Under these conditions, separating out the independent effect of any one program is no easy task. As good scientists, our impulse is to insist that any promotional effort be designed as if it were an experiment, replete with control groups and the means of measuring return on investment built in. But imagine the joy with which a product manager will greet the news that you have recommended that the latest TV ad campaign include Boston, Chicago, and San Diego and hold out Philadelphia, Houston, and Los Angeles as controls. And no sales rep, knowing his or her bonus is dependent on sales in his or her territory, wants to hear the headquarters will be making anything but maximum effort on his or her behalf.

As a result of resistance to most attempts at experimental design, we typically must evaluate programs after the fact, using statistical and analytical techniques that attempt to overcome limitations in data. Our effort is aided in that rigorous hypothesis testing is seldom required. And in any case, when dealing with anywhere from thousands to tens of millions of observations, issues such as lack of data, sparse cells counts, and statistical significance are seldom a concern.

In the paper, we will describe a series of problems typical to the industry and describe the analytical issues. In the presentation, as time permits, we will suggest approaches to solving them and present results to illustrate these techniques and the power that these tools bring. In particular, the areas that we will explore are customer segmentation at product launch, ROI and the optimal timing of complementary promotional efforts, analyses of managed care impact in sales and customer targeting, and studies of resource allocation in response to a competitor's product launch.

a) Market Segmentation at Product Launch

Product launch is generally held to be a critical period in the overall commercial success of a product. A fast-starting product can establish momentum that allows it to gain and maintain market share at the expense of less successfully launched competitors. Early adopters, those innovators in the medical community who, because of seeing a more acute patient population, working in a research environment, or personal style, are the physicians likely to be among the first to prescribe new products.

Ironically, this group tends to be a small minority of the professional community. The majority of prescribers, typically primary care physicians, treat the more acute cases only as referrals from specialists and prefer to wait for additional safety data before trying new products. Identifying the early adopters and focusing tailored promotional efforts on this segment (as opposed to broadcasting a general message to all physicians) can be crucial to the success of the product.

(b) Evaluation of ROI and assessment of interaction effects

Although sales force detailing of physicians is the most visible means of promoting products, considerable effort is expended on "extra-promotional" programs. One such program is a dinner meeting where an outside speaker and/or moderator leads a discussion among a group of physicians over dinner regarding approaches to treating certain illnesses. The style can range from low key to hard sell. In any case, it is designed to have those physicians (perhaps early adopters) who are already writing one's product to share their (presumably positive) experience with physicians still on the fence.

These dinners are thought to be a valuable promotional tool. Some physicians are only accessible through this means. Others will not readily accept information from a sales representative. Finally, it may be that the message from a
representative, in conjunction with reinforcing data from a practicing physician, will have a more powerful effect.

These programs are expensive, costing upwards of $500 per physician. The logistics typically are arranged through outside vendors specializing in these events. These firms vary greatly in their ability to recruit physician attendees, orient/train speakers and moderators, and, ultimately, in their ability communicate a company’s message and drive sales. And everyone “knows” that the effectiveness of a dinner meeting is greatly enhanced by a follow up call from the sales representative.

Identifying the firms giving the best ROI, minimally, is a management imperative. Assessing the interaction effect between meetings and follow up calls is helpful in targeting and in determining tradeoffs between programs. Can a dinner meeting attended by a “hard-to-see” but otherwise valuable physician substitute for a representative call? Are some physician segments essentially unresponsive to meetings or calls, but the two in combination show measurable increase in prescribing? And can we determine an optimal time for the sales representative to follow up, along with a point at which the value of the follow up call becomes negligible?

(c) Analysis of effect of change in managed care/formulary status

Managed care offers an interesting challenge as its impact cuts across the normal dimensions of concern. A high writer of products in one’s comparison market --- including presumably of one’s own product --- due to a change in formulary status may be restricted from writing your product for some portion of his/her patients. Identifying the size of the immediate “hit” and the extent to which his/her remaining business remains favorable --- allows for optimal resegmentation and targeting.

Establishing certain thresholds for managed care impact (20% of the physician’s business? 50%? 80%) can allow for avoiding over-sensitivity to this dimension. Physicians may not always know --- or care --- what the prescribing guidelines are for each and every new or continuing patient’s insurance plan. (Frequently these controls are actually mediated at the pharmacy when the pharmacist runs the patient’s pharmacy benefits card through the system.) A physician in an area with a diverse patient population may be seeing patients covered by as many as fifteen or twenty plans. The extent to which any one determines prescribing habits (and any spill over to other plans or cash customers) is helpful information. Which physicians have essentially become non-targets, which have diminished value with respect to one’s products, and which remain (or even have improved!) as targets is crucial information to effective targeting and differentiating one’s promotional message.

(d) Tuning of segmentation scheme following competitor’s product launch

A final problem consists of addressing significant changes in the market place and modifying one’s promotional efforts accordingly. At some level, product teams are continually adjusting their efforts --- weekly reports to senior management on the progress of their product impose this. Nevertheless, any large-scale promotion will take substantial time to plan and implement and cannot (nor should not) be tinkered with willy-nilly. Periodic reassessment, however, is appropriate, whether on a planned schedule or when “outside” events dictate this. Label changes, favorable or un-favorable media coverage, changes in patent status and the like are appropriate moments. A new competitor in the market may be another factor.

In the latter instance, some portion of current prescribers’ business is at risk. In newer therapeutic areas, an alternative dynamic can be that while one’s own product loses market share to the new competitor, the combined weight of promotional programs can grow the market in this area and one’s sales may nevertheless continue to increase. Survey research, focus group interviews, and competitive intelligence are critical tools early on in devising counter-promotional strategies. As actual prescribing data accumulates post-launch, this analysis permits determination of the market dynamics (are we competing for the same market or a growing one), identification of physician segments where attrition in writing one’s product is occurring, and the appropriate re-segmentation.

REFERENCES

M. Berry and G. Linoff, Data Mining Techniques, John Wiley, 1997
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