BUSINESS INTELLIGENCE and SEARCH ANALYTICS

by

Seann G. Bernshaw

INTRODUCTION

The ultimate goal of any business investment is to quantify the cost-benefit of any specific strategy. This has been the great challenge for SEO practitioners. The conventional measure has been average rankings as the primary measure of success. Click through rates offer some help but conversion rates are often sparse or difficult to compute. However, it seems clear that historically, the study of ranking data has failed to test the statistical significance of changes in response to various SEO strategies.

We have seen reports of dramatic changes in organic rankings based on small samples and absent any statistical verification. Can we believe a statement that eBay has lost 80% of its organic rankings? Other statements of similar acclaim have been made which on the face are intended to promote controversy that Expedia has lost 25% of their search visibility? Reporting at this standard is a blemish on the SEO industry as it reflects the lack of competent analytical methods being applied to search optimization verification.

A recent publication by MOZ represents a solid beginning to the statistical review of search ranking relationships. They look at correlations between various Page-Level Keyword Usage Features, Domain-Level Keyword Usage Features, Domain-Level Link-Authority Features, Anchor Text Features, Social and Brand Features, and other features and ranking performance. The statistical methodology (Spearman's Rank Correlation) employed appears correct with the proper assumptions about the underlying data. However, the process of data quantification is still a bit unclear. Regardless, it must be said the study represents a discerning look at specific SEO tactics and their impact on search rankings.

Overall, the SEO industry needs to meet the challenge of rigorous analysis and adopt a new standard of evaluation. There are tools which can be applied to remedy this shortfall and bring SEO Analytics into the era of Business Intelligence and data exploration. The question remains as to how we proceed to assay the impact of SEO initiatives.

As SEO practitioners, we need to capture and understand the relationships between the various applied tactics in such a way as to illustrate to clients the optimal way to achieve their business goals. Developing a Business Intelligence Strategy for your client is a plan that evaluates performance and guides the deployment of initiatives through data mining and statistics. In the context of internet search and big data, this has never been more important. The SEO industry has kept pace with the changing analytics of site rankings but has failed to expand a quantitative aspect in evaluation of specific strategies.

We can further refine this concept into the area of Marketing Intelligence. The primary goal of the SEO practitioner is to maximize the viewership of client websites. Although in todays' competitive markets this is a necessity rather than an option in order to keep pace with the competition. There is also an element of product differentiation that has penetrated the SEO

purview. The strategies for optimization have evolved over the last few years. Data availability has also changed given modifications to Google Analytics and the increased reliance of SEO agencies on data partners. Furthermore, there are more factors to consider as search algorithms change and viewers have more options as far as connectivity. Social media and YouTube certainly have had an additional and profound impact.

The question then remains relative to the deployment of SEO strategies. There is the familiar "toolbox" from which we can draw. However, there is the question of which tools provide the most immediate or profitable results. Therefore, in a business sense, the issue is which is the most commercially viable alternative? Techniques need to be developed to examine the efficacy of SEO strategies. A business case needs to be made for each deployed initiative. There are many topics offered by this context of review that need to be explored.

In a conventional business context, the criteria would be the rate of return (ROI) of the investment. Specifically, one may look at the internal rate of return (IRR) as the most appropriate. IRR answers the question of which of the initiatives will return the highest yield. But how can this be determined in the SEO world? Is it possible to rank alternative investment projects in the SEO context? There are techniques which enable this type of evaluation and we will explore the various types of quantitative analysis below.

The toolbox of tactics mentioned above is well understood. It is possible to categorize them into four broad groups: 1) Keyword Features, 2) Content, 3) Technical, and 4) UX. Within each group there are many different specific tools used to maximize rankings. For the purposes of this discussion, it would serve no purpose to elaborate further on the detail. Suffice it to say there are manifold techniques within the main categories which offer targeted influence on ranking outcomes.

STATISTICAL ANALYSIS

There are a wide range of statistical techniques that lend themselves to the evaluation of the effectiveness of the various approaches to search optimization. For this analysis, we will consider two main types of analysis; descriptive statistics and inferential statistics. Both offer an enhanced view of the outcomes of deployed stratagems. We might also argue that they are sequential stepping stones to the ultimate answer to the question of the return on investment.

Descriptive Statistics

In the context of the evaluation of SEO tactics, we need to construct an experiment. If there is to be a deployment of a set of new features, we need to outline a marketing intelligence roadmap. We assume that ranking data are collected on a daily basis. Furthermore, we have identified a target date for the "go-live" of the new feature set. With this in view, we can start collecting and building a dataset of daily ranking data prior to the "go-live" date. The more advanced the planning the more data can be collected. This "sample size" consideration is paramount in any statistical analysis.

Once the features are live, again we collect the daily ranking data. One needs to emphasize sample size requirements. Once the features have been active for a sufficient period, we are set to finalize our dataset and analyze the results. Under the heading of descriptive statistics, it needs to emphasize we are not looking for causality. We are merely presenting a more complete description of the data. Specifically, we are looking for statistically significant changes in the ranking between the base period and the intervention period.

Descriptive statistics present, as the word suggests, a description of the data. If we are looking at ranking data, we want to know as much as we can as far as the characteristics of that data. Within the class of descriptive statistics, there are four main elements that describe a distribution of data: 1) mean or average, 2) variance, 3) skewness, and 4) kurtosis. If we know these figures, we can describe the distribution of data. With the dataset as described above, we are now in a position to conduct the analysis.

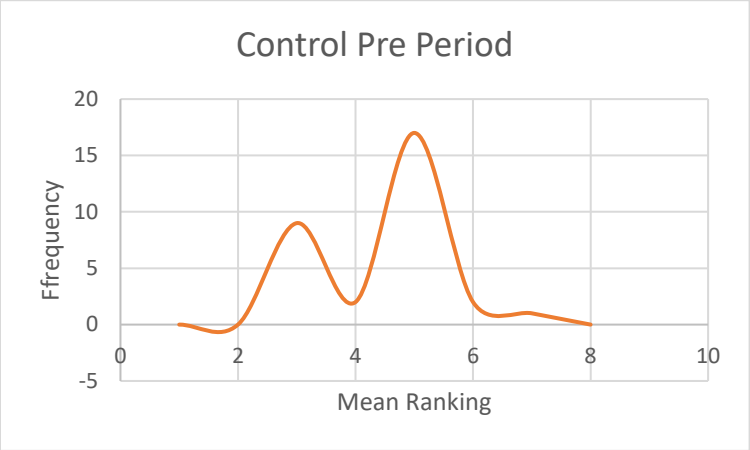
The first step would be to calculate the descriptive statistics outlined above for the two groups, before and after. Having done this, we are in the position to perform our first statistical test. The tests we are to use are sequential in nature. We strive to be systematic in our approach and be confident that each subsequent step has been preceded by solid procedural methods.

Statistically, our initial step is to determine whether the variances of the pre and post groups are the same. The question is whether the dispersion of the data has changed from one period to the other. Has the deployment of the strategy affected how the mean rankings are dispersed? Are the rankings more spread out or are they more centrally clustered about the mean. To do this we perform a simple F test for equal variances. The result of this has two functions.

This initial test allows us to conclude whether the dispersion has changed. This becomes more apparent once the data are plotted and we can visually compare distributions. Additionally, the result may provide insights into the efficacy of the new features. Average ranking may not have changed, but the way the rankings are dispersed may have changed. Perhaps they are more clustered around the average (mean) ranking, or they are more spread out. The mean ranking may not have changed but the effect may have impacted the variance.

The F test also has relevance to a subsequent test to ascertain whether the mean ranking has changed between the base period and the intervention period. By use of a simple student's t-test, we can examine whether there is a difference in the mean ranking pre/post. We are hypothesizing there is no difference in the mean ranking. If the calculated t-statistic exceeds the critical value, we can say there was a significant change in the mean ranking and conclude we can reject to hypothesis that they are equal.

It is very useful to plot the data since a visual inspection is often a great supplement to the numerical data. By overlaying the plots of the before and after data, we can see the impact of the change in mean ranking as well as the change in variance. Where the numbers may not make sense, the visuals illuminate the results. The graph below shows a hypothetical example of pre and post data.



Mean Ranking Pre Data 3.97

Median 4.0

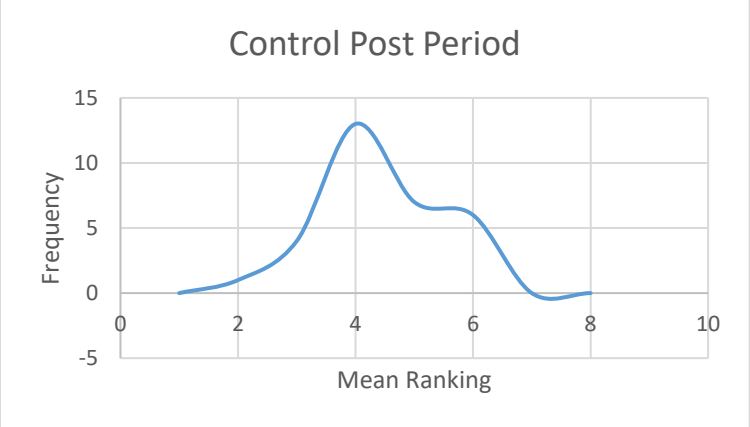
Mode 4.0

Variance 0.021

Skewness 0.032

Kurtosis -0.083

Range 0.6



Mean Ranking Post Data 3.74

Median 3.73

Mode 3.73

Variance 0.0122

Skewness -0.398

Kurtosis 0.094

Range 0.47

If we were solely relying on the numerical evaluation, clearly we see that the post mean ranking has decreased from 3.97 to 3.73. The desired result. The variance has also decreased. We also observe the distribution is more skewed (less symmetrical) to the left or lower rankings. There was also a slight increase in the tallness or focus (kurtosis) of the distribution. Lastly, we discern a decrease in the range of the ranking data from 0.6 to 0.47. Combined with the improvement in the mean ranking, this indicates a more clustered distribution of ranking data.

Visually, we also notice the pre data is bi-modal. That is to say there are two “bumps” in the data. From a ranking perspective, the unusual characteristics of the base period ranking data distribution has been corrected. All of the descriptive statistics support this conclusion. Most important, it can be said the mean ranking has been improved.

The F-test and the following t-test indicated both the variance and the mean rank changed significantly from the pre period to the post period. It is now with confidence a practitioner can make a statement that the deployment of the new features had a positive outcome on mean ranking data. Furthermore, the additional descriptive statistics as well as the graphical presentation illustrate a thorough understanding of the pre/post difference.

Inferential Statistics

The analysis above is a first step in completing a Marketing Intelligence roadmap for the SEO practitioner. Moving into the realm of inferential statistics permits a close inspection of the

relationships of the various SEO tactics to outcomes. However, in order to complete this type of evaluation, we need to specify a "model" of the relationships we are interested in. Specifically, we need to formalize what correlations will provide the best understanding of the interactions between tactics and measured outcomes.

In the process of identifying a model, first we need to target an outcome variable. The descriptive analysis looked at mean ranking as the primary variable of interest. However, in the inferential context, we have the opportunity to drill down into other measures of success. If Marketing Intelligence is a roadmap, then we need to plan in advance to capture the relevant outcome data to accomplish an inferential study. The ultimate goal would be to ascertain the consequence of an initiative on sales conversions for the client company.

The requirements then demand the SEO agency to work closely with the client company in obtaining final sales information. The SEO data partner company is also critical in making sure a robust dataset can be assembled. Without this background of cooperation, a complete dataset cannot be assembled.

The goal of this process is to establish a "causal" relationship between various intervention methods and sales or revenue values. In terms of procedure, like with the descriptive exercise, there is a clear stepwise method that needs to be followed. This provides that the results are free of statistical anomalies and the results are without bias. A first step is looking at the various tactics and determining the correlations between these "independent" variables.

One vital step is to quantify, or set numerical values to the independent variables. This can be accomplished in a number of ways. As an example, we can look at the presence or absence of a tactic throughout a period of intervention. If a tactic is "live", we may assign a value of one. If off, it takes a value of zero. We could also provide some ranking on a scale as to the degree to which a tactic is deployed. Suffice to say there are ways to quantify keywords, content, technical measures, as well as UX.

An independent variable is an explanatory variable. It contributes to the movement of the "dependent" variable. The dependent variable in this case is a measure of sales or revenue. To select which independent variables we may want to include in our model, a correlation study is performed. By looking at the significant relationships identified by the correlation study, we can select the best independent variables to include in our explanatory model.

Once we have identified our best set of independent variables, we are ready to define the model and perform the analysis. Without belaboring the statistical methodology, our aim is to apply multivariate regression techniques to explain the variation in sales or revenues. Our expected result is a statistically significant estimate of the influence of each of the selected independent variables on sales or revenue. The implications for this class of results are manifold.

For the SEO practitioner, a more focused deployment of initiatives is possible. From a business standpoint, it is now conceivable to prioritize tactics. Thinking in terms of Marketing Intelligence, long term plans can be formulated with a forecast of targeted ROI values. With continued application of this type of analysis, the SEO agency has the advantage of predicting the value of SEO initiatives and guiding clients on an efficient revenue path related to SEO marketing.