Advanced Analytics

The Power of Prediction

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EXECUTIVE OVERVIEW

Or, as Dwight D. Eisenhower put it, "Neither a wise man nor a brave man lies down on the tracks of history to wait for the train of the future to run over him."

As many times as you may have heard it, it bears repeating: the huge amount of data being generated today changes the very nature of business. Companies that currently invest in analytics are more profitable than their competitors. But analyzing what happened, even what just happened, even in huge volumes of data streaming from devices or coming from social interactions, won't cut it.

Looking ahead, imagining new possibilities, predicting new opportunities – these are fundamental to human nature, and they're best practices in every human endeavor, whether it's developing a new low-cost treatment for patients in rural areas to transforming a time-honored business or launching a new company. Companies that invest in the people, skills, and solutions to look to the future will be the disruptors that fundamentally change their industries, right under their rivals' feet.

What does it mean to look ahead? And how do you do it? Given the volume of information, it's impossible to do manually, or to constrain to a small group with specialized skills. This is about crowdsourcing the expertise in your workforce, empowering your people to imagine the future so you can capitalize on your collective intelligence to achieve it.

NOT EITHER / OR…AND

Capitalizing on collective intelligence requires putting people and solutions and data together in a way that makes sense, without artificial constraints. You shouldn't have to string together multiple tools to get good answers, nor should you be limited to one type of data, or style of analysis.

Oracle Business Analytics (Oracle BA) is a complete solution for business analytics serving the needs of an entire organization, from the agility of visual analytics and self-service discovery to the power of an enterprise platform that both integrates advanced and predictive analytics, as well as enabling you to incorporate your own analytic methods using a self-service framework.

This paper gives an overview of how Oracle BA offers easy access to advanced analytics, providing you powerful new insight into your data. You will:

1. Get a quick tour of some of the advanced analytics capabilities in Oracle BA and how they help you see new insights and predict outcomes.

2. Learn how techniques such as forecasting, trending, binning, cluster and outlier analysis offer a different perspective on your data and understand the business benefits.

1. ADVANCED ANALYTICS AND PREDICTIVE CAPABILITIES: THE QUICK TOUR

Advanced analytics is the practice of using statistical methods, data mining, forecasting, modeling and related techniques to analyze data. The integration of advanced analytic capabilities in Oracle BA takes a number of forms, ranging from native capabilities available out-of-the-box to tight integration with the widely used statistics and analytics package R. Traditionally, these types of analysis have been the realm of advanced users, not accessible to the broader business community. Oracle BA changes that by making these capabilities available to ALL your stakeholders quickly and easily, often through a simple menu click. You can also easily extend these existing capabilities by registering your own R functions with Oracle BA (which is covered in a separate white paper).

2. ADVANCED ANALYTICS TECHNIQUES: GAINING A NEW PERSPECTIVE

3. Some of the Oracle BA Advanced Analytics techniques are illustrated here using sample retail data to show how easy it is to take your analytics to the next level.

2.1. Trend Line

Say you need to get insight into how your revenue is trending over time, perhaps to smooth out the effects of seasonality. A trend line immediately provides insight to the prevailing direction of a set of data.
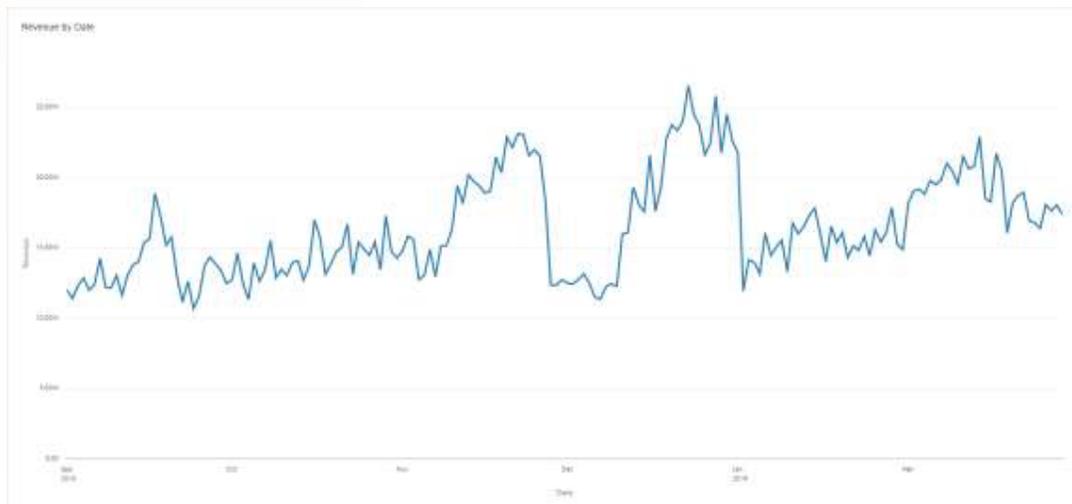

Figure 1. Base data values, revenue by time

Even though there are distinct seasonal spikes in Figure 1, the general direction is not immediately obvious – in fact, it would be possible to glance at it and draw the wrong conclusion. Inserting a trend line provides removes doubt, increasing insight and accuracy. This is as easy as selecting 'Add Trend Line' from a contextual drop-down menu:
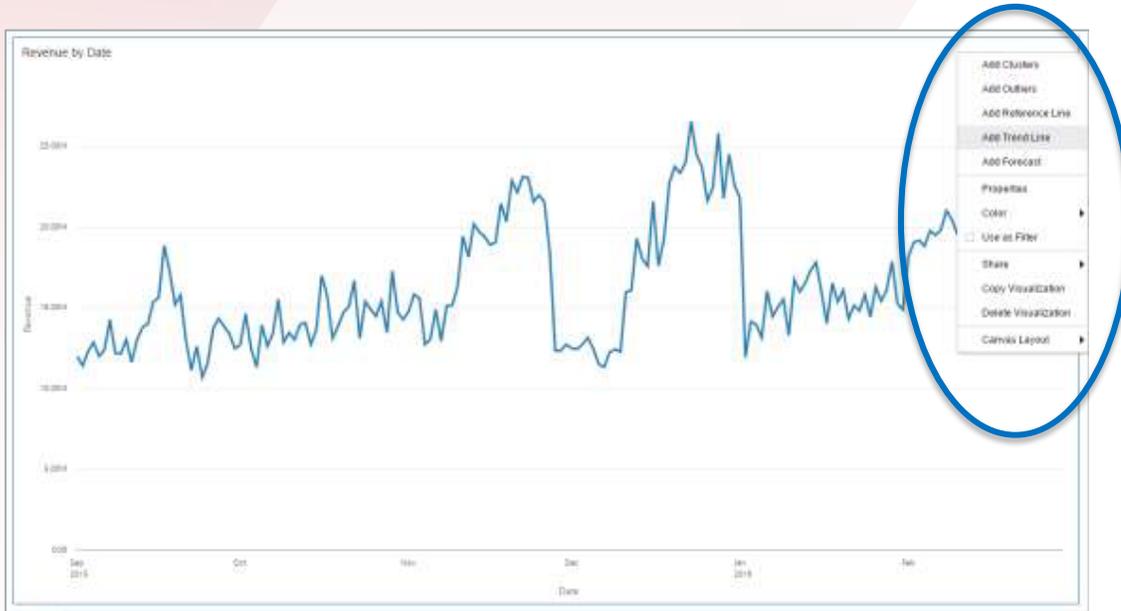
Figure 2 Adding a trend line via a contextual menu

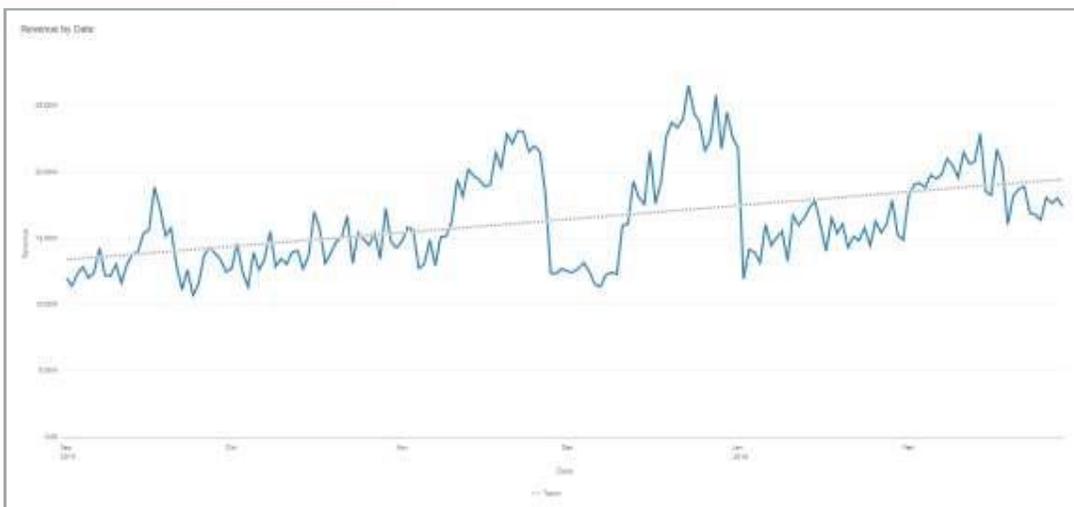**With the following result:**

Figure 3 Chart with trend line clearly showing revenue trend

It is now clear that the trend is increasing. In addition to this linear trend line, it is possible to modify it to an exponential trend (suitable for data that changes with increasing rates) or polynomial trend with variable degree (suitable for data that trends to a curve) as needed based on the overall shape of the data being analyzed.

2.2. Binning

Binning is a great way to make sense of a numeric value series and arrange that value into equal range groupings (or bins) of data. The Oracle DV 'bin' function can return either the bin number or the high / low value of the bin range. Now you're looking at some order data to understand how you can reduce shipping costs. The first chart below shows the raw order data by time, with the y-axis displaying order quantity.
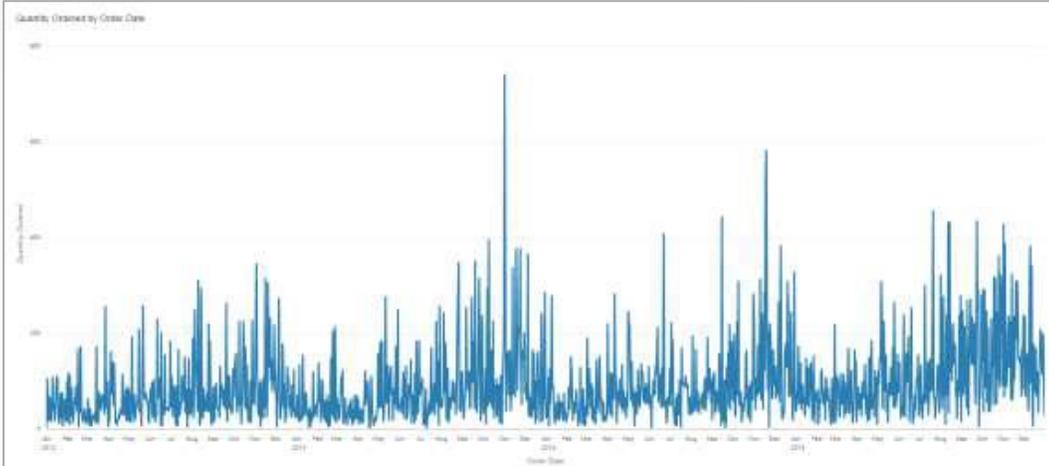

Figure 4 Raw data for order quantity by time

Since you're interested in understanding how to reduce shipping costs, applying a binning analysis to this data enables you to see how many orders of a given size you're shipping. In this case, you're going to use a calculation that will split the orders into five bins of equal width:
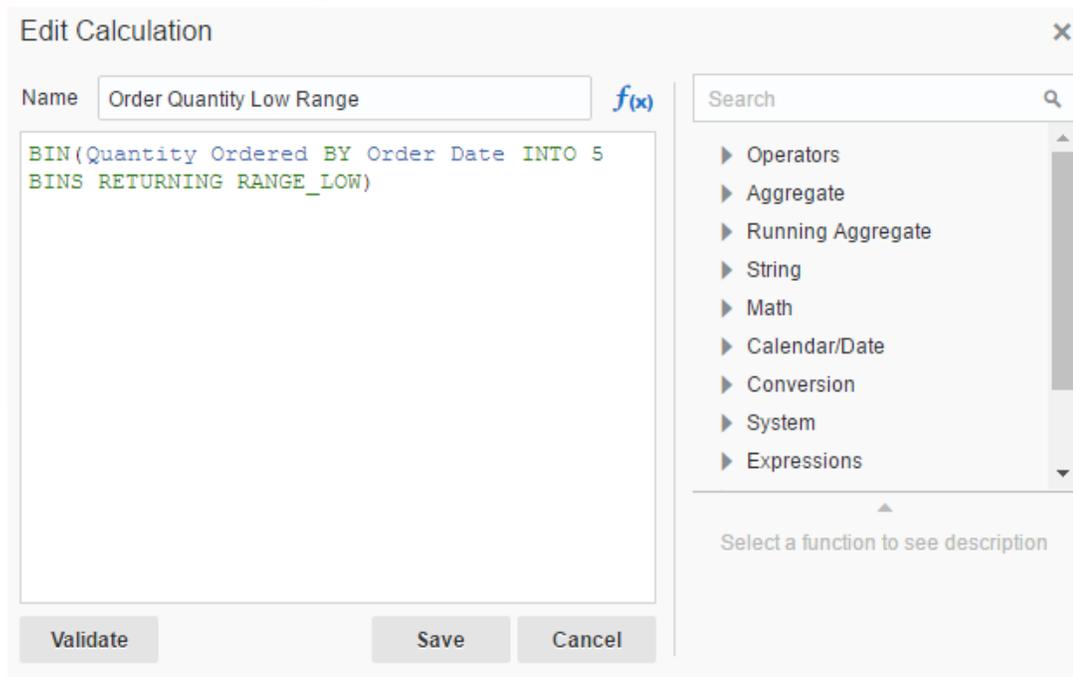

Figure 5 Oracle DV calculation editor defining a bin, returning the low value for each range.

When you plot this bin on a chart, in addition to a calculation which returns the high value for each range, you get the following analysis.
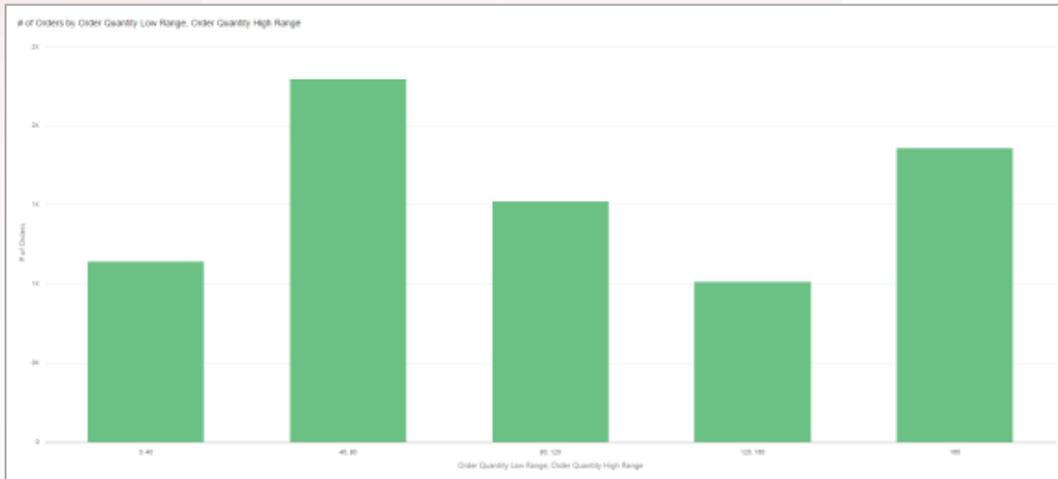

Figure 6 A bin analysis of the number of orders binned by order quantity

The bin analysis immediately shows that you have the largest number of orders where the quantity ordered is between 40 and 80 items. Oracle DV makes it easy to break this out by product category (color of bar), shipping cost (width of bar) and product sub-category.
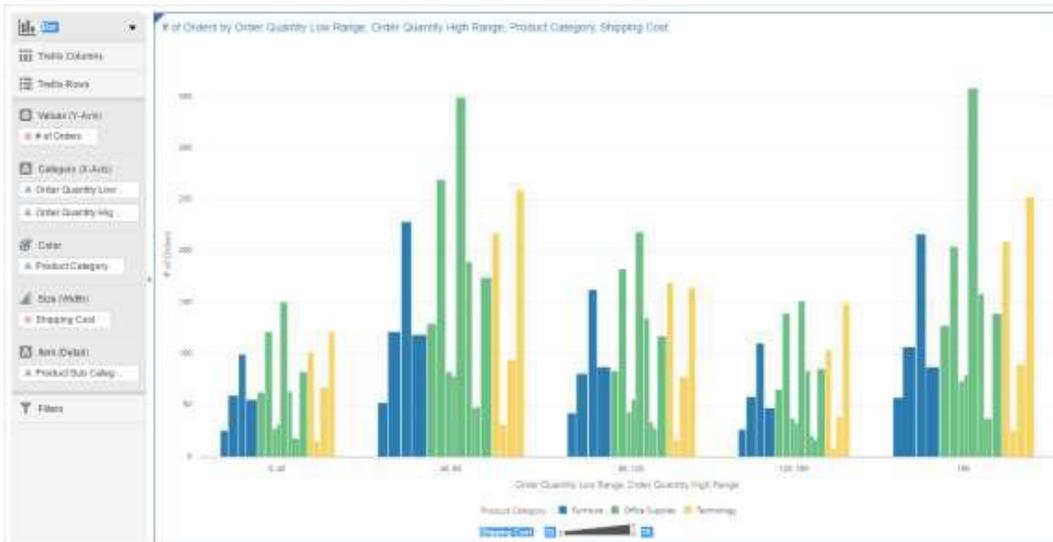

Figure 7 A bin analysis broken down by product category, product sub category and shipping cost

The resulting analysis shows that your 'office supplies' product category—specifically paper—is the most popular product across all sizes of order. Now you can then use this information to negotiate lower shipping costs with your vendors and carriers.

2.3. Tight Integration with R

Oracle BA has tight integration with the popular statistics and analytics package R. This can take the form of a distribution of R that ships with Oracle BA for integrated advanced analytics, some of which are illustrated here or integration with Oracle R Enterprise (ORE) for high performance analytics. Details will be covered in a separate white paper.

2.4. Forecast

Wouldn't it be great for your business if you could predict the future? In the real world, the ability to create a forecast of your data is the next best thing. The 'Forecast' function enables the prediction of future values based on the creation of a time-series model over historical values. A key aspect of the forecasting implementation in Oracle BA is the ability to automatically create the future periods if they don't already exist, making it substantially easier for business users to take advantage of this powerful capability. The following is an example of how to easily create a revenue forecast over time in Oracle BA.
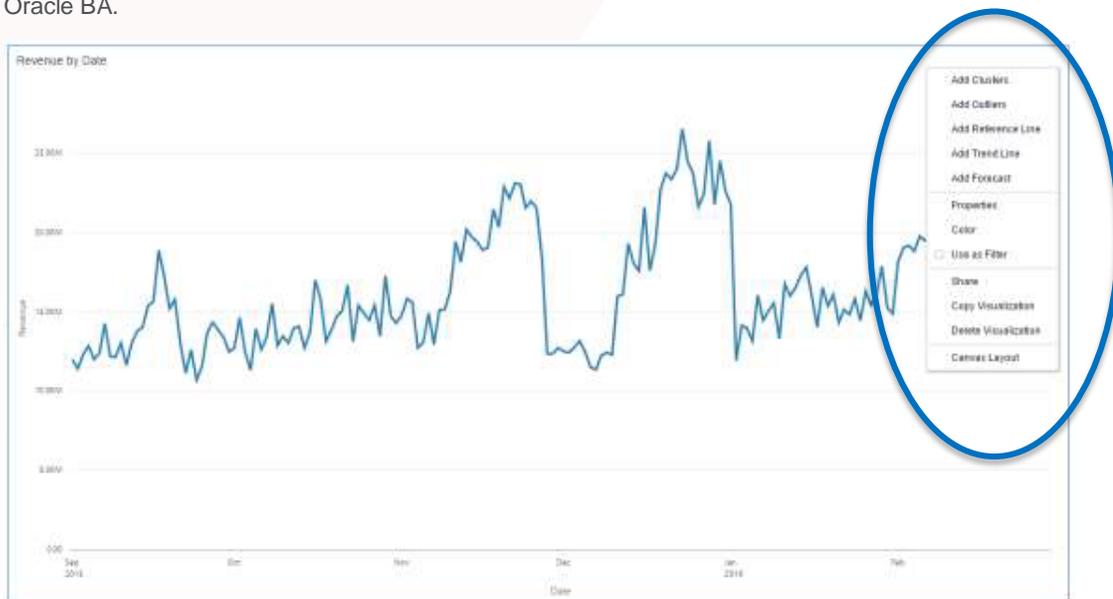

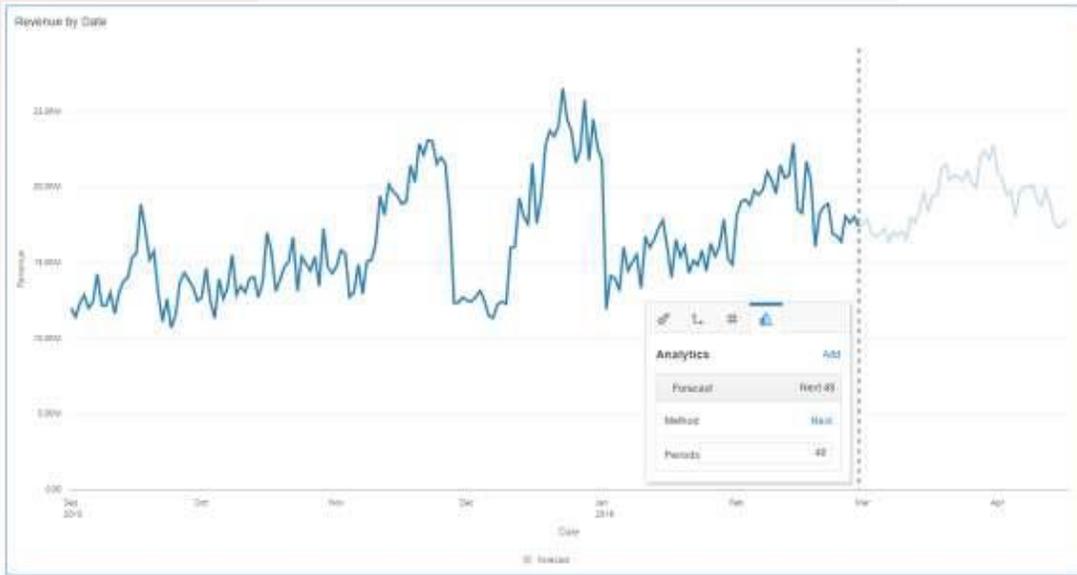Figure 8 Easily add a forecast to your analysis with in context menu items

Figure 9 The resulting forecast with forward looking periods automatically added

2.5. Cluster Analysis

Clustering provides a key method for obtaining insight over large datasets by grouping them according to statistical methods. Oracle BA supports clustering using the K-Means or Hierarchical Clustering algorithms. You've already found something in your shipping data to help reduce costs, and now you can take that further to see how you can increase profit. Start with a scatter plot of shipping cost against quantity ordered per product name.
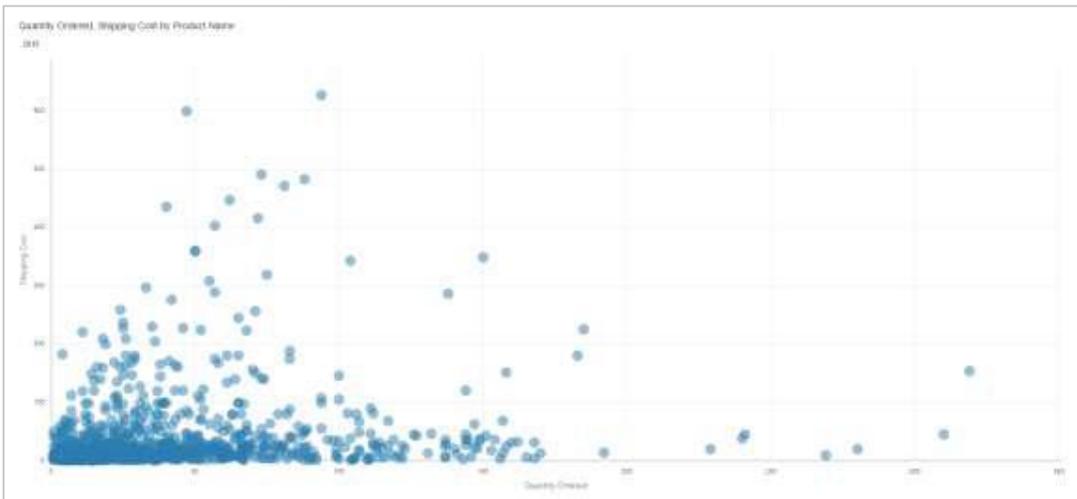
Figure 10 A plot of shipping cost against order quantity for product

The addition of a cluster analysis to this chart immediately shows you how the products group together related to order quantity and shipping cost, insight you can use to enable process changes that can help reduce costs.
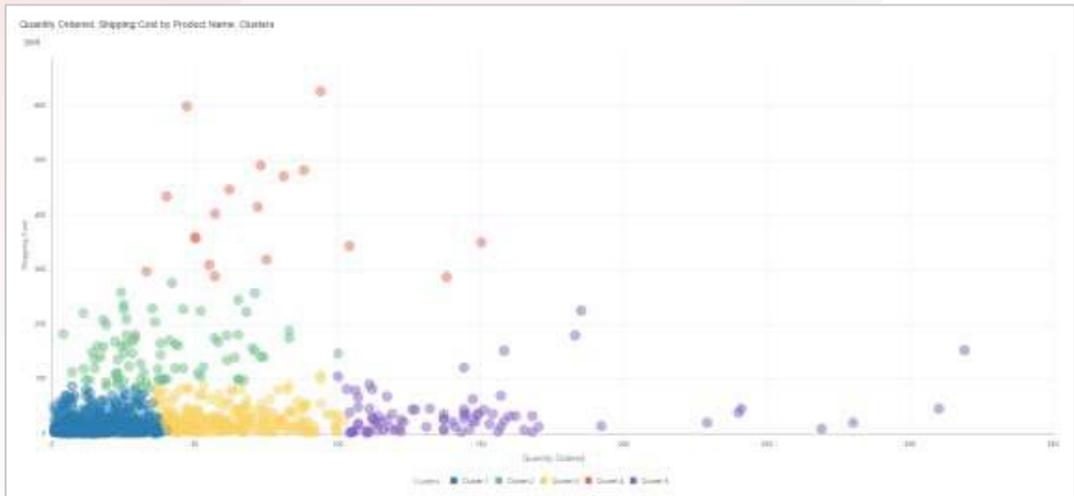
Figure 11 Addition of a cluster analysis, in this case 5 clusters illustrated by color

2.6. Outlier Identification

Identifying outliers is critical to your efforts to reduce costs associated with shipping products. The outlier function classifies a record as an outlier based on one or more input expressions using K-Means or Hierarchical Clustering or Multivariate Outlier detection algorithms. The following chart illustrates the outliers identified by Oracle BA, which form an initial list of products so you can investigate and start shipping cost negotiations.
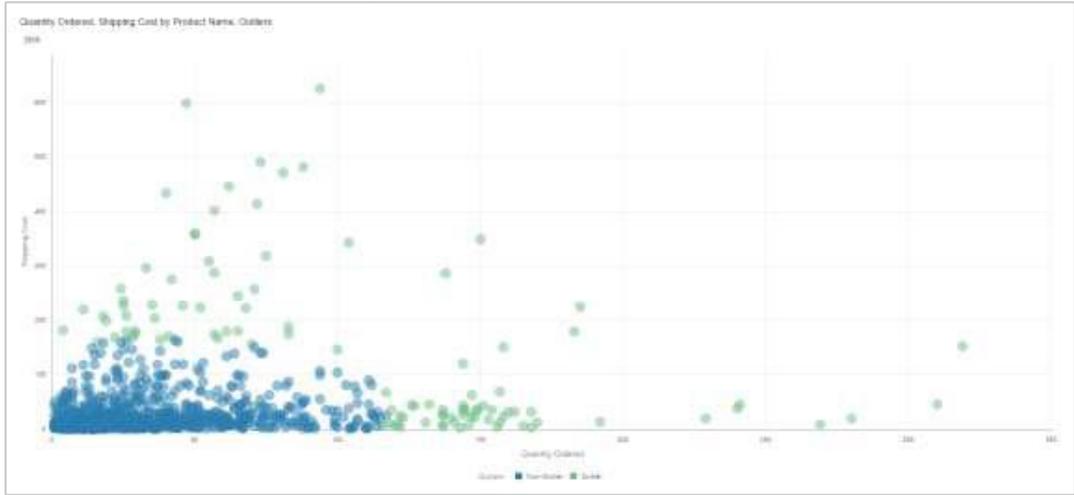

Figure 12 Adding an alternative perspective to your shipping cost analysis by identifying outliers

SEEING THE FUTURE

There are experts throughout your organization, people with a good sense of the business and where it's headed. Putting easy advanced analytics in their hands, whether it's a click to see trends or extending insight by incorporating your own algorithms, fosters a data-driven approach to decision-making and prediction that gives you a solid view to your future. This approach empowers your existing experts and helps create new ones, enabling you to make the most of all your resources.

LEARN MORE

Now you've seen what's possible and how easy it is, check the links below for hands-on follow-up, share with your colleagues and join the discussion on the community site:

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White Paper **Advanced Analytics**
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