algorithms run as native SQL functions; not as PL/SQL scripts, call-outs or extensibility framework add-ins. Models are first class database objects that can be built, applied, shared, and audited.

In the early 2000's, starting in Oracle Data Mining Release 9.2*i*, Oracle's first data mining algorithms took advantage of available core Database's strengths—specifically, counting, parallelism, scalability and other database architectural underpinnings. Essentially, the first two Oracle data mining algorithms, Naïve Bayes and A Priori algorithms, are based on counting principles. They count everything very quickly and then assemble conditional probability predictive models—all 100% inside the database. Neither the data, the predictive models nor the results ever leave the database.

OAA Naïve Bayes algorithm can quickly builds predictive models to predict e.g., *"Who will churn?", "Which customers are most likely to purchase Product A?"*, or "What is the probability that an item will fail?" Let's take an example in a bit more detail for comprehension. Let's say we are interested in selling Product A (e.g. a motorcycle or $500 shoes, etc.). The Oracle Advanced Analytics data mining algorithms, specifically the Naïve Bayes algorithm, of all the customers who purchased Product A, it counts how many customers were male vs. female. How many rent an apartment vs. owns their own home? How many have children and how many? Each of these answers involves counts that, taken together, can form a complex conditional probability model that accurately predicts whom we should target to increase our likelihood of selling more of Product A.

OAA's A Priori "market basket analysis" algorithm counts items in each customer's transactional "baskets" while looking for co-occurring items e.g. A + B appear together frequently, and then provides conditional probability AR rules. For example:

> **IF,** "Cereal" AND "Bananas" appear in the same customer's basket,
> **THEN,** the "Milk" is also likely to appear in the basket.
> *WITH Confidence* = 87%, and *Support* = 11%.

Armed with these types of new customer insights from Oracle Advanced Analytics, a store could decide to place the milk near the cereal and bananas, offer new promotional "breakfast kit" product bundles or make real-time customer specific recommendations as the customer checks-out. This is just a simple example of the types of ways that big data analytics can find "actionable insights" from data. Obviously, more data, more advanced analytics methodologies and fast enterprise wide deployment can open new doors to many new big data and analytics applications and solutions possibilities.

SQL and R Support

Where SQL is the standard language for data management and has been for 40+ years, for data analysis, various languages compete—R, SAS, Python and SQL and others. SAS, S+, SQL, SPSS and Matlab have been long time favorites, but in recent past years, open source R especially has surged to the top of the pack and Python and others have emerged. Per the KDD Nuggets data mining industry community annual polls (http://www.kdnuggets.com/polls/), R and SQL currently compete for #1 and #2 positions, respectively.

The good news is that Oracle Advanced Analytics supports both languages—SQL and R. There are legions of developers who know SQL for data management and Oracle provides support for data mining and advanced analytics via Oracle Advanced Analytics' SQL data mining functions and provides tight, industry leading integration with open source R statistical programming language.

Most Oracle customers are very familiar with SQL as a language for query, reporting, and analysis of structured data. It is the de facto standard for analysis and the technology that underlies most BI tools. R is a widely popular open source programming language for statistical analysis that is free and because of that is taught in most data