

g-COM Cargo

galor – Cluster Optimization Model Cargo: The solution for high/low-show-prediction in air cargo

Challenge

A key ingredient for offering optimal prices to customers and for optimally assigning orders to available load capacity in air cargo industry is a high quality prediction of actual high and low shows with respect to weight and volume of every incoming order.

Benefits

The improved quality and accuracy of expected customer order realization leads to improved planning capability which is the basis for improved revenues.

Data mining and analysis is highly relevant for high/low-show-prediction in air cargo. The predominant task in the analysis of massive data is the identification and understanding of (statistically) relevant structures and a subsequent valid prediction of future observations.

Extracting knowledge from customer data

Analyzing customer order data at the highest level of accuracy is important for an optimal segmentation of customer orders into homogeneous groups. With **g-COM-Cargo**, the customization of **g-COM** for prediction of high and low shows in air cargo industry, such a segmentation can be calculated on the basis of multivariate attributes of customer order data. The clusters come with characterizations of the corresponding customers and a prediction on the level of realization of their orders. Based on this analysis revenue and capacity load managers can choose segment individual prices and optimally adjust accepted orders to load capacities.

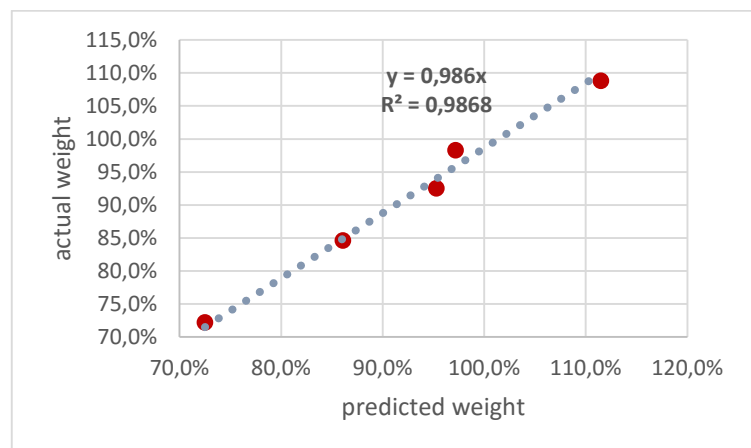
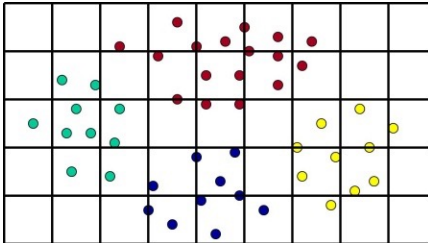
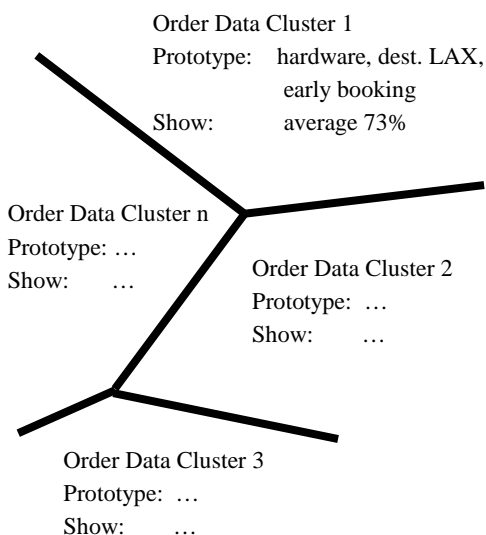


Figure 1: Cluster related show-prediction

As an example, in a recent study optimal fencing criteria for orders of a major air cargo carrier had to be determined on the basis of about 100.000 data sets. Using **g-COM Cargo** relevant features of the customer order data could be identified. As it turned out, high- and



Sparsely populated or empty cells



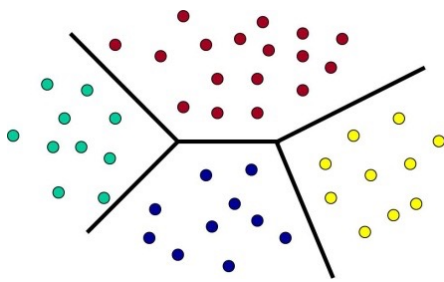
low-show with respect to weight and volume were dependent on the multidimensional characteristics of the order features. See Figure 1 for an example of the relation between predicted and actual average high- or low show for customer orders placed into five clusters.

Disadvantages of standard methods

Standard approaches typically employ pre-segmentation techniques that are based on the independent analysis of the influence of all relevant parameters. Geometrically, this leads to a dissection of the parameter space into a typically large number of boxes. In the presence of a reasonably large number of parameter characteristics and specifications the generated cells are typically sparsely populated. Hence, quite often, an application of the law of large numbers is prohibited and different, more complicated and less reliable, statistical techniques have to be evoked.

g-COM: A change in paradigm

g-COM uses a reverse, data driven paradigm. Rather than imposing a simple dissection on the parameter space followed by complicated statistics **g-COM** computes an optimal data-only based clustering of this space and subsequently applies meaningful and reliable statistics. Until recently such an effective and efficient application of this natural principle was out of reach due to the lack of an adequate mathematical model and fast algorithms for clustering of high dimensional weighted data, including nominal data, under all relevant problem specific constraints. While standard clustering methods are capable of determining rather homogenous structures efficiently, such additional constraints could not be incorporated appropriately. Further, standard methods are typically restricted to computing solutions that are merely locally optimal, while the new technique is capable of creating globally optimal solutions. **g-COM** therefore allows to gain new insight in the dependencies and interactions of all parameters for the respective application by allowing for a significant analysis of the clusters at optimality.



Significant substructures

g-COM in a nutshell

g-COM, the galor Cluster Optimization Model, first solves an application and data specific complex clustering problem with the aid of state-of-the-art and newly developed mathematics and software technology. **g-COM** thereby identifies homogenous substructures within the total body of data and performs a robust and statistically significant analysis of the multivariate interactions of all parameters. This is the bases of the **g-COM** prediction method which can then be used for the classification of new data.

Knowledge discovery with g-COM Revenue

With **g-COM Cargo** the typically inhomogenous set of customer order data is segmented into a small number of groups that can be completely described by fencing criteria. In contrast to classical sub-group analysis this multivariate approach guarantees the detection of large enough but still quite homogeneous customer segments so as to warrant significant results that can be assessed by the revenue or capacity load manager's favorite tool. **g-COM Cargo** is able to determine representative orders of the relevant groups and provides in depth analysis. Combined with the knowledge and experience of air cargo managers this yields a new and precise way of interpreting customer data. **g-COM Cargo** can either be combined with standard tools or function as a stand alone tool with various taylor-made front end tools.

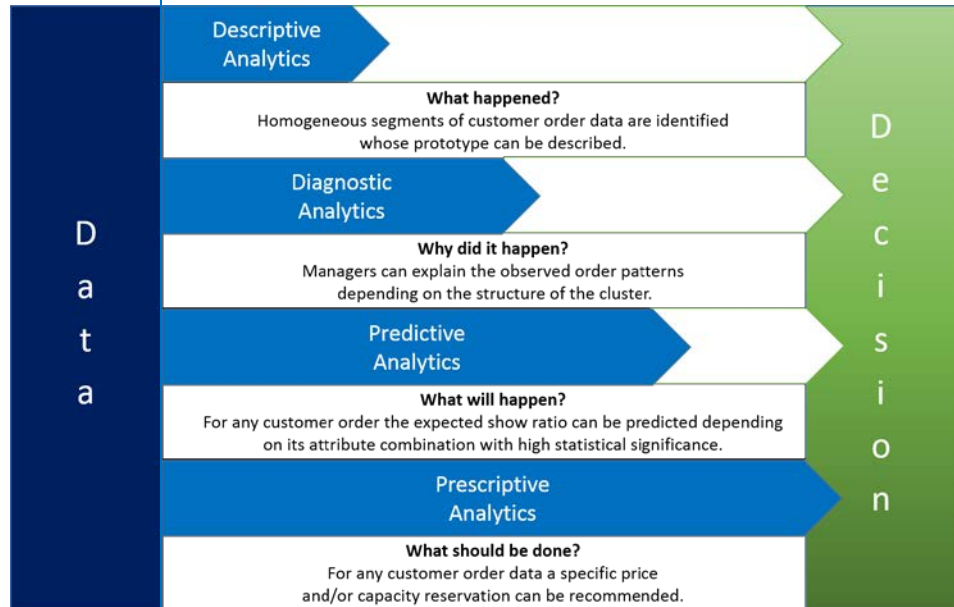
g-COM Cargo within the realm of business analytics

g-COM Cargo can be described within the realm of the phase model of business analytics:

What happened? This task is performed by identifying and analyzing homogeneous substructures of customer data and their prototypes. **g-COM Cargo** reveals these structures in a form that is directly accessible by managers.

Why did it happen? On the basis of the structural information air cargo management experts gain new insight in the correlation between multiple attributes and the resulting potential for pricing or overbooking strategies.

What will happen? Based on the identified structures within the high-dimensional space of attributes **g-COM Cargo** provides significant predictions for the behaviour of any individual customer order. In fact, its attribute combination places a new customer order into a reference group and on price or overbooking action can be decided in real-time.



Inspired by and in style of Gartner, #G00254653 (September 2013)

What should be done? **g-COM Cargo** can be used to derive a new price differentiation and/or overbooking system.

Unlike other methods, **g-COM Cargo** does not function as a black box but allows for reasoning.

Starting a project

To assess the potential of **g-COM** in a new field of application the following is needed:

- A short description of the application including the desired analytic goals;
- A list of the relevant parameters and their specifications;
- A representative set of test data.

Contact us!

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General applicability

g-COM can be applied to a great variety of data analysis tasks in various business sectors. It has already been proven highly successful in the prediction of credit and insurance risk, air cargo demands, and medical treatment efficacy.

