RELEX

FORECASTING APPROACHES

WHITE PAPER

Author: Mikko Kärkkäinen, Group CEO, D.Sc. (Tech.)

RELEX forecasting approaches

FOR AS LONG as humans have recorded their past they have also looked to their future. Our ancient dreams of being able to 'know' the future are closer today than ever before.

Technology has transformed forecasting, enabling us to process unfathomable quantities of data and draw conclusions with an unprecedented degree of accuracy.

The right tasks with the right tools

THOUGH OUTLIER EVENTS without strong precedents are hard to forecast, regular day-by-day, week-on-week, month-to-month sales, or seasonal demand or promotion-led events; these are all eminently predictable. However to achieve the most accurate results it's wise to be wary of models or assumptions that could skew results, but rather select from a range of tools and techniques choosing the right ones for each task on the basis of results.

With the latest technology a small team of analysts (a team of as few as 3-5 specialists can crunch the data for a big retail chain with thousands of stores and millions of SKU/store combinations) can run a highly effective retail planning operation. Great technology multiplies expertise so it can be applied to the widest possible range of situations.

Nevertheless, in retail forecasting one needs good foundations. You can't plan for what is happening now; you can only react to it. However, given reliable forecasts, a business can plan and develop strategies that take it towards its business goals.

For many businesses this starts with configuring and automating demand forecasting, inventory management and replenishment ordering for their core ranges; typically items that sell year-round, perhaps with variations in sales through the week or season or year, but a distinct pattern nevertheless that can be forecast from good, pre-existing sales data.

This is bread and butter forecasting. We've always taken the approach that for stable demand patterns forecasting should be robust and reliable. There are various models that we use singly or in combination; naive, moving average and exponential smoothing.

These are the underpinnings for any retail (or wholesale) operation. The aim is to produce something with a stable, and low error level. I wouldn't want to say that through automation one can more or less forget about forecasting and replenishment for these core areas, but with thorough configuration and alerts for exceptions, it's possible to radically reduce the amount of time taken managing these products - and that is time that can be deployed to tackle more challenging forecasting situations.

It is important to stress however that it is important to get these basics right. If errors are unacceptably large it's difficult to move forward. What's more it can rapidly lead to a loss of confidence in the system. One hears stories of large forecast errors leading to disastrous decisions, which have in turn more or less derailed system implementations as managers turn to their own experience and instincts over unfamiliar technology that they feel unable to rely on.

When RELEX started out the forecasting options available to many of our customers were limited. We wanted to provide something robust that would reliably keep forecast errors within acceptable margins in a wide range of situations. Our 'baseline' forecasting has been based on time series forecasting for a long time, and over time we have developed it to perform exceptionally well. This is relatively easy with good quality data sets, but the trick is to make it work robustly and accurately even when one encounters a number of typical exceptional patterns, such as long periods of zero sales, or low volume seasonal products.

> We've always taken the approach that for stable demand patterns forecasting should be robust and reliable.

Extraordinary forecasting for forecasting the extraordinary

HOWEVER RETAILERS DON'T just need to manage routine demand. They also want to be proactive and shape demand through promotions, price cutting, presentation, marketing and advertising. So for a long time now we have used different models and approaches to forecast for these situations.

More recently, in the summer of 2015, RELEX reached a landmark when we perfected our support for multiple forecasts. This opened up a whole new range of possibilities. It's now not just feasible but simple to bring two or more forecasts to bear on a given situation - robust models for steady forecasting (consistently low error margins, no major mistakes) and more specialist models for high degrees of accuracy.

Forecasting models three broad families

THERE IS A wide variety of models available but they tend to fall under one of three categories:

► **Time series forecasting** provides a stable base-level forecast and is good at handling regular sales patterns.

► **Regression-based forecasting** is very useful for modelling the impact of a business's own commercial decisions. For instance it's very effective for analyzing the impacts of price changes, marketing campaigns, different approaches to presentation and display, substitute-product promotions and so forth.

► **Machine-learning-based forecasting** is an excellent tool for modelling the impact of external variables such as competitor pricing and price changes. Many businesses that we've worked with have encountered machine-learning-based forecasting when using it to incorporate weather conditions into forecasts. That probably reflects both the impact that weather can have on sales and the widespread commercial availability of good quality weather forecast data. But it's not limited to weather and pricing. Machine learning can be used to study and analyze the impact of other events for which there's available information, such as sporting events, concerts, traffic density and so forth, to see if there's a statistically significant impact on demand.

Because RELEX can accommodate multiple forecasts, analysts can choose to run several forecasts for the same scenario, using a different model for each, chosen from a variety offered by the system. The relative accuracy of these forecasts can then be continuously (and automatically) compared via RELEX's UI, which makes it easy to pick the best forecast for each decision.

RELEX also holds all the data states in its memory so that any snapshot can be picked from any moment and compared with any other or with the present. For instance; analysts can compare the accuracy of a medium term demand forecast made when the replenishment team was ordering items for the DC against one made six weeks later, looking ahead just 48 hours, when it was calculating store orders. If there are discrepancies in the levels of accuracy one can look around for other factors, such as the weather for instance, that could have had an impact. Some of these factors can be addressed and accuracy increased.

The ability to calculate and compare different forecasts allows the supply chain and replenishment team to keep both forecasts and forecasting models under constant review. For instance if it was decided that we want to monitor the accuracy of machine learning models we can analyze their accuracy in the past and make a comparison with future projections using time series forecasting.

We can set up automatic alerts when the two diverge beyond any set of parameters. This can be really useful, because it can use the more workaday forecasts as a check on the more complex styles. This allows the analysts on a retailer's supply chain team to use more advanced tools and external forecasts with greater confidence - and can also help fine tune the forecasting so that the retailer can reap the benefits of increased average accuracy.

So, as you can see, RELEX's forecasting options allow you to build on a solid, reliable base of good forecast accuracy and then move to more advanced and more complex tools. These can offer extreme levels of accuracy, knowing that you have double-checks, the option of layering or combining forecasts and of being able to fine tune any part of the process safe in the knowledge that you always use super-reliable approaches such as time series forecasting until you are wholly happy with other options.

RELEX

HOW TO PROCEED?

Contact me
By e-mail:
mikko.karkkainen@relexsolutions.com
or call me: +44 7802 658 237

Let's meet!
An hour's meeting is enough to
go through your company's
current situation and to define
the first steps!