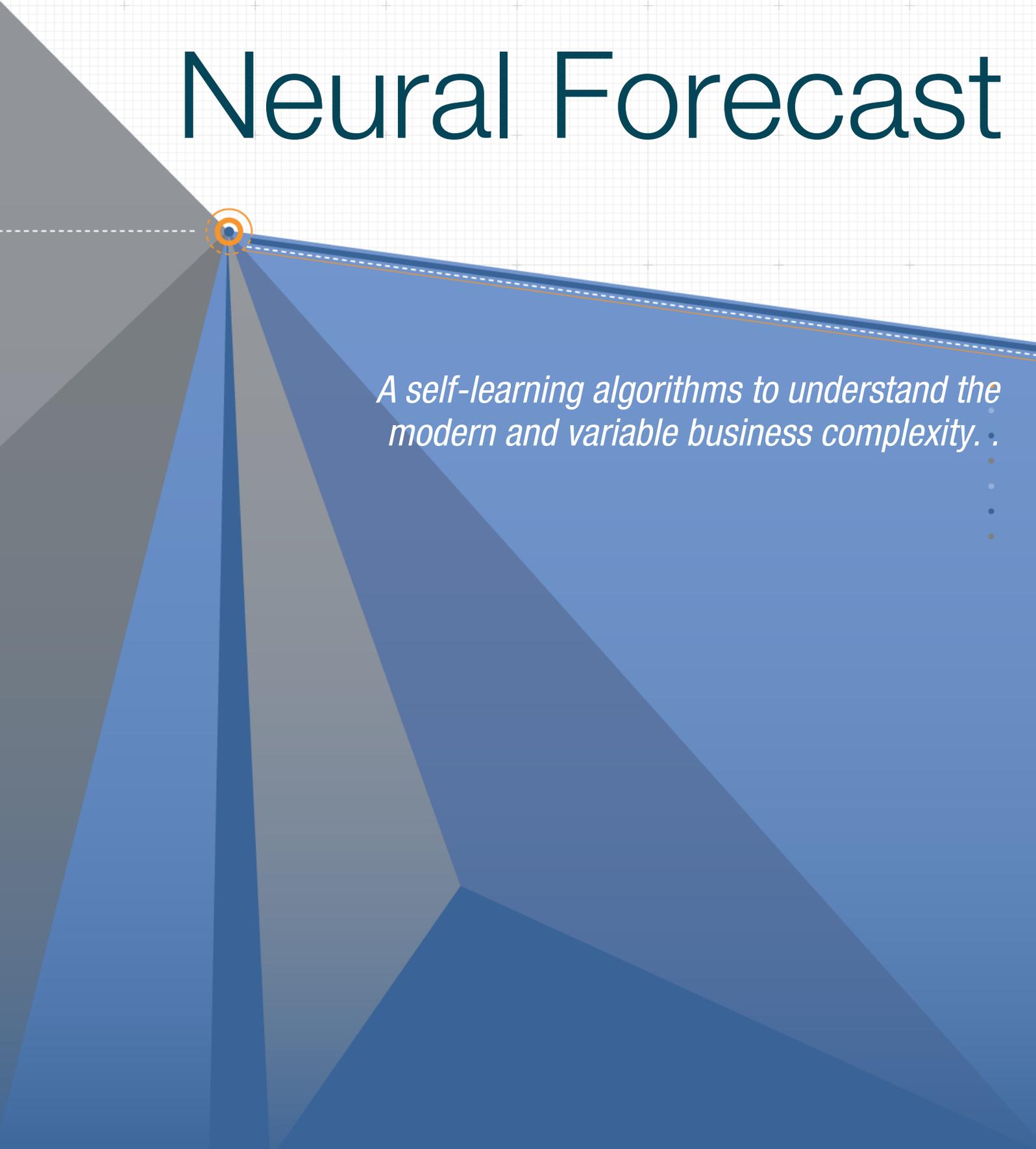


Neural Forecast



A self-learning algorithms to understand the modern and variable business complexity. .





Unilever Argentina

- Industry: Consumer Goods
- An implementation of Baseline Neural Forecasting

Challenges

- SAP APO will be implemented in the region in approximately 2 years.
- SAP APO comes with a battery of time series statistical models to build baseline forecasts.
- Time series models are only able to use a single variable, past shipments.
- Unilever Argentina has been collecting multiple data from multiple sources (e.g. sell-out, client stocks, back orders, price changes, etc.).
- Is there a way this additional information can be exploited to produce a better baseline?
- Is there a way to provide more disaggregated forecasts to enrich the entire S&OP process?

Solutions

Continente Siete developed and implemented an alternative methodology based on Neural Networks:

- **What are Neural Networks:** In machine learning and computational neuroscience, an artificial neural network, often just named a neural network, is a mathematical model inspired by biological neural networks. A neural network consists of an interconnected group of artificial neurons, and it processes information using a connectionist approach to computation. In most cases a neural network is an adaptive system changing its structure during a learning phase. Neural networks are used for modeling complex relationships between inputs and outputs or to find patterns in data.
- **Neural Networks and Demand Forecasting:** these algorithms are capable of retrieving complex emerging patterns from multiple variable datasets. The algorithm excels traditional multivariate approaches by:
 - Not requiring a priori hypothesis (structural relationships between variables are automatically detected)
 - Applying non-linear equations
 - Having the ability to learn from past errors

- Once run, the algorithm “trains” itself with a subset of the input dataset, finding new patterns and relationships based on past accuracy metrics. It then proceeds to “cross-validate” these findings with the remaining partition of the dataset, thus making sure it is detecting “causal” and not “casual” factors. These relationships are finally applied to build the forecasts.
- Baseline Neural Forecasting: the proposed approach uses multiple variables (shipments, sell-out, customer stocks, Unilever stocks, etc.) as input for the model, which is then processed to define the output forecast. A Neural Network is mapped to different types of customers (there is a network for retail customers, one for regional retailers, one for wholesalers and one for pharmacies). Forecasts are built at the SKU-customer level for important customers (the rest are grouped for each network). Output is LAG 1-9 weekly forecasts and LAG 2 monthly forecast.
- The Experiment: Continente Siete developed and set up the Neural Networks and then proceeded to test it against the current approach (S&OP final forecast, Unilever does not keep track of baseline forecast), and the alternative approach (SAP APO forecast). Test was based on all products and customers within a whole product division, and for 23 weeks in 2012.



Benefits

- Baseline Neural Forecasting showed 18% forecast accuracy improvement over SAP APO baseline performance.
- Baseline Neural Forecasting showed 8% forecast accuracy improvement over current Unilever Final S&OP performance.
- Forecasts are now provided in a disaggregated fashion (by channel, and by customer for the most important customers).
- Baseline can be provided in a weekly fashion, in an automated and un-biased manner.



About Continente Siete

Continente Siete is an algorithm workshop, where mathematical models are constantly being developed to address complex problems.

What is an algorithm?

It is a step-by-step procedure for calculations.

We are Able to use them in different áreas for different problems.

What do we offer?

We have a set of “plug-and-play” products to attend specific needs.

But we feed our innovation process by building tailor-made solutions for our clients. Our core is our methodology, which allows us to work across industries with ease.

We move between two worlds (academic and business) and with this bridge we bring knowledge and innovation to results.

How do we do it?

People + context + tolos. Continente Siete is a transparent company with amazing people and the right technology. We keep our engine running (fun and engagement) through challenging requests.

We have worked in many industries, including demand forecasting, on-line marketing, transportation, behavioral targeting and telecommunications.