Churchill AI
Powered by Azure

Promotional Demand Forecaster™ v5.2
Application Overview

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1.0 An Introduction to Churchill AI

Churchill Systems Inc. provides Demand Intelligence Solutions to retailers worldwide. Our solution addresses the demand forecasting challenges of merchandise, price, promotion and inventory planning. Our philosophy centers on the concept that an accurate forecast is an integral part of successful planning. Churchill's business objective is to help companies achieve higher financial returns with our forecasting, analytics and optimization software solutions and related implementation services. We accomplish this by providing high-quality, credible AI-based forecasting in large volumes. This allows the retail planner to concentrate on exceptions, analysis and other key planning functions.

The following sections provide a basic understanding of the various components of the PDF forecasting system. The document introduces:
- Promotional Demand Forecaster™v5.2 (PDF)
- PDF Business Objectives
- PDF Demand Forecast Model-Building Process
- PDF Demand Forecast Generation Process
- Ongoing Support and Model Maintenance

Churchill Consultants can provide further information through demonstration, discussion and documentation.

2.0 Promotional Demand Forecaster™ v5.2

At the core of Churchill's predictive/analytics demand lift technology is Promotional Demand Forecaster v5.2™ (PDF). PDF is a very high scale "lift forecaster" that analyzes your customers' reaction to the various elements of your pricing and promotional event strategies (the "causes") in order to determine the predicted increase in demand (the "effect"). PDF begins with collecting historical sales and promotional data, as well as product and location hierarchies. Churchill engineers then go to work auditing and validating the data in preparation for model-building. Next our engineers train the neural network models using your data that show how consumers react to the marketing tactics of a pricing or promotional strategy. The neural engine is trained using hundreds of thousands of examples of your customers' reactions so that unique buying habits are uncovered. This knowledge allows the retailer to create highly effective and profitable promotional campaigns and provides increased visibility into the sourcing and ongoing inventory requirements based on consumer demand.

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Some of the features of our Promotional Demand Forecaster include:

- ✓ Detailed item-store level forecasts delivered daily, weekly, or ad hoc.

- ✓ Promotional Factor Analysis determines which marketing activities drive sales

- ✓ What-If Analysis to determine best marketing options for achieving business objectives (i.e. best price discount, product placement, print ad, etc.)

- ✓ Multiple forecasting applications can be combined to create a unique software solution to meet your specific needs.

Promotional Demand Forecaster™ v5.2 has been specifically designed to seamlessly integrate with in-house and third-party price, promotion and inventory systems. Additionally, PDF output can be added to data warehouses for understandable extraction.

2.1 Business Objectives

The most significant forecasting challenge that the modern-day retailer faces is the overwhelming number of detailed forecasting decisions that must be answered every day. The days of generalized or summary forecasting is rapidly coming to an end. Customers want their merchandise at the right price, at the right location and at the right time.

The business objective of Promotional Demand Forecaster is to provide meaningful retailer-specific demand intelligence that can be then be leveraged in several ways. For example:
- In Supply Chain, it might be improving inventory fill rates or reducing out-of-stocks.
- Planners of pricing and promotions may focus on revenue and profitability.
- Merchandise planners leverage Churchill AI for assortment, allocation, and markdown optimization. This is achieved through proven, high volume AI Machine Learning technologies.

Churchill leverages the vast amounts of customer behavior data available and applies proven science-based technologies with measurable results.

Common planning challenges that Churchill's Promotional Demand Forecaster address include:
- *How much will our new lower prices increase gross margin?*
- *What will be the impact of a front-page advertisement on sales?*

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- *How much inventory will each store need to support next month's promotional event?*

Several examples of PDF usage are illustrated:

2.2 Promotional Demand Forecast Model-building Process

Conceptually, promotional forecasting is straightforward. It is a prediction of the increase in demand for an item due to one or more marketing strategies. In practice, promotional forecasting is very complex. The complexity arises in trying to determine the combined effect that the many elements, or factors within a specific marketing strategy will have on consumer demand.

For example,

- Which factor or group of factors will have a greater effect; a front-page advertisement with a 10% discount or a middle page advertisement with a 20% discount?

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- What if the item is positioned more prominently within the store?

- What is the difference if the same promotion runs in April vs November?

All of these promotional factors will have an impact on consumer demand. These nonlinear interrelationships need to be quantified using machine learning-based promotional demand forecasting models. Any given promotion can have between 5 and 30 different factors impacting demand. The following is an example of just some of the many input factors that are involved.
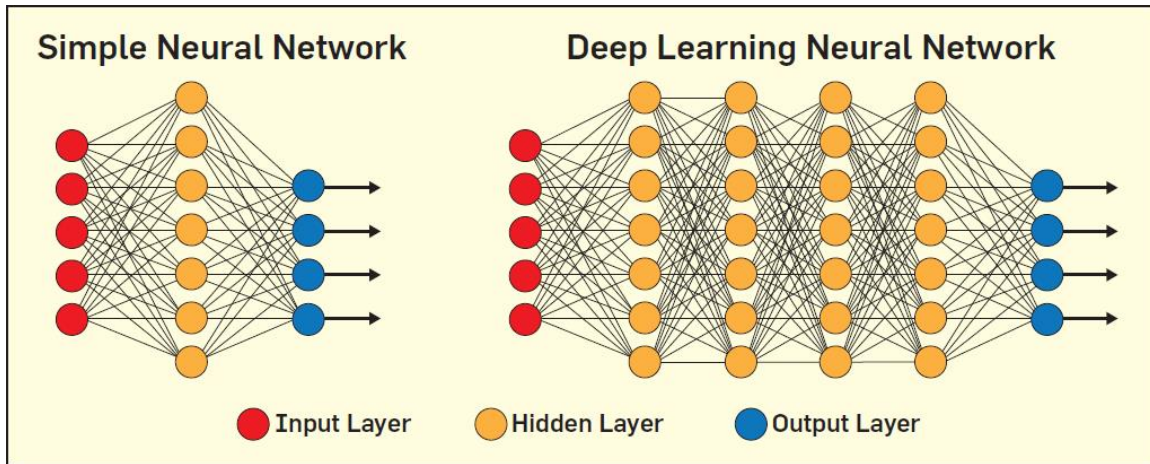

The complexity of the nonlinear interrelationships that exists between the marketing factors is staggering and requires Machine Learning technologies to process the large volumes of computations involved. Churchill experts will guide you through the data collection process step by step, so that little or no IT involvement is required.

The Use of Neural Network Engines
The complexity of the non-linear relationships between the promotional elements poses a huge forecasting challenge. In order to meet this challenge, Churchill has elected to utilize neural network forecasting engines. Each retailer has a unique set of customers, so Churchill trains a unique neural network engine for each retailer. Often several neural network models or engines are trained, to represent different categories or types of customer.

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Using neural networks to forecast has several advantages over alternative modeling methodologies such as multivariate regression. These advantages include speed, user-friendliness, and flexibility. Speed is an important benefit when trying to forecast in a production environment at the location, store, or customer level. Remember, we generally need to forecast and reforecast millions of store/item combinations. User-friendliness means that the users do not have to be experts in statistics (or neural networks) to use the PDF application. Unlike multivariate regression, neural networks do not need complete or totally accurate information in order to generate a quality forecast.

For additional information on forecasting with neural networks, please refer to relevant White Papers that are available on Churchill's website *www.churchillsystems.com*.

2.3 Promotional Demand Forecast Generation Process

Once Churchill engineers have built and tested the models for your retail environment, these models are implemented into the Churchill AI application. Forecast requirements are configured and the regular processing of the demand forecasts is scheduled.

Upon completion of the periodic forecast run, an output file or table is then sent to the location of your choosing. It could be the Churchill Team Edition Viewer, a third-party reporting tool, or various planning systems. Normally price and promotional event demand forecasts are utilized as part of a larger retail planning process such as Price Planning, Promotional Event Planning, Inventory Planning, Assortment Planning, etc. Often our application is integrated to feed several retail planning systems, without any additional user activities necessary.

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However, PDF forecasts can also be utilized for analytical purposes. "What If" questions such as "What is the strategic value of supplemental advertising?" or What is the minimum price reduction necessary to cause a meaningful "lift" in demand?" are often posed by the planner.

Additionally, it is the nature of retailing that planning occurs in groupings of very large quantities (such as a category or a price zone). Even though the retailer is attempting to service individual customers, they must do so in the context of large numbers of items, locations, etc. Churchill AI makes that possible.

2.4 Ongoing Application Support and Maintenance

Churchill support staff are available during normal business hours for any application questions or inquiries that arise. After hours support is available in certain cases.

As part of the annual license subscription, Churchill will refresh your existing models once per year using the most recent historical demand data available. This ensures that the forecasting models continue to reflect the current demand behaviors of an ever-changing consumer. New models can be generated, if necessary, to include new items and locations.

3.0 Summary

Churchill's Promotional Demand Forecaster™ is a fully integrated causal demand forecaster. It is very scalable and compatible with virtually all price, promotion, inventory, etc. retail planning systems. PDF provides the demand intelligence that retailers need to service the unique demands of individual customers. For over 30 years Churchill has provided Demand Intelligence technologies to retailers of all sizes. Let us know what Churchill AI can do for you!

Visit the Churchill Systems website for more information at *www.churchillsystems.com*

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