



Internship Summary 2018

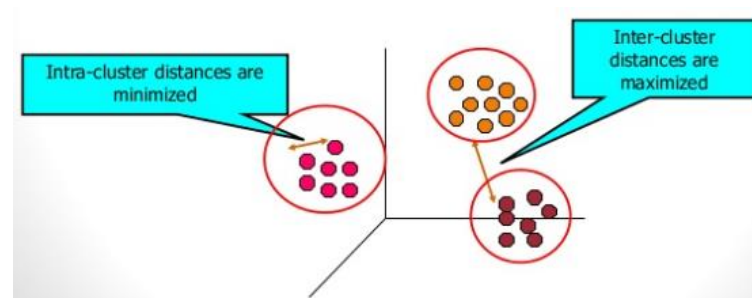
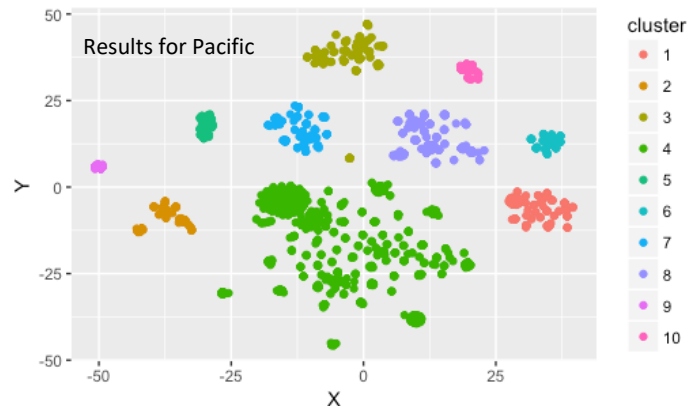
Marketing and BI - Gustavo Oliveira - 8/22/2018

1. Project Proposals
2. Tier Segmentation Process
 1. Solution
 2. Results
3. Volume and Revenue Forecast Guidelines
 1. Solution
 2. Results
 3. Next Steps
4. Recommendations
 1. Data Management
 2. Data Science
 3. Marketing

1. Internship period: 7/10/2018 – 8/23/2018
2. Austral 2.0 Tier Segmentation
 - a. Define Key Commodities: MIA RO needs ⇔ Austral 2.0
 - b. Define clusters for every trade by Commodity, Volume and PortPair.
 - c. Delivered 7/26/2018
3. Volume and Revenue forecast guidelines
 1. Exploratory analysis
 2. Model fitting
 3. Guideline definition for forecast process
 4. Next steps

Solution

1. Use of K-means Cluster Analysis to segment SQ's based on pre determined similarities
2. Gower's distance measure was used to calculate distance between SQ's using numerical and categorical data (Commodity, Volume and Portpair).
3. Validation with all the Trades



Deliverables

1. Definition of MIA RO Commodity Breakdown
2. Excel file with clusters for each trade by ZOL / ZOD – Volume – Commodity (Austral and MIA RO).
3. Commodity Mapping from MIA RO commodity definition to AUSTRAL 2.0 definition
4. Zone mapping from MIA RO to AUSTRAL 2.0 definition
5. Instructions and file structure for updating and running the complete process again every quarter.
6. Automated VBA Macro and R codes for running the process.

Key Commodities Definition – MIA RO

Suggested Key Commodities	Reefer Breakdown	Dry Breakdown	
CHEMICALS & RESINS	REEFER - F REEFER - FROZEN	CHEMICALS & RESINS	FOODSTUFFS
COFFEE	APPLES, FRUITS & VEGETABLES	CHEMICALS	DFN
FAK	ASPARAGUS MEAT	RESINS	FOOD PRODUCE
FOODSTUFFS	AVOCADO SEAFOOD	FAK	RICE
FOREST PRODUCTS	BANANA REEFER - OTHER	AGRICULTURAL	VEGETABLES
MACHINERY	BERRIES CHEMICALS & RESINS	AMMUNITION	LIVE ANIMALS
MINERALS & METALS	CHERRIES CONFECTIONARY	ANIMAL WASTE	FOREST PRODUCTS
REEFER - FRESH	CITRUS DRY FRUITS	BATTERIES	FINISHED WOOD PRODUCT
REEFER - FROZEN	GRAPES OTHER REEFER	BOATS AND YACHTS	KLB
REEFER - OTHER	KIWI PHARMA	CLAY	LOGS & LUMBER
SCRAP	MANGO PLANTS	CONSOLIDATED GOODS	WASTE PAPER
SUGAR	MELONS WINES & SPIRITS	CONSTRUCTION MATERIAL	WOODPULP
WINES & SPIRITS	ONIONS	COTTON	WOODWASTE
	PINEAPPLE	COTTON FABRICS	MINERALS & METALS
		E GOODS	METALS
		EMPTY CONTAINERS	MINERALS & CONCENTRATES
		FLOAT GLASS	SCRAP
		HAY ANIMAL FEED	E SCRAP
		HIDES	GLASS SCRAP
		OTHER FAK	METAL WASTE
		PHARMA	PLASTIC
		TIRES	RUBBER SCRAP
		TOBACCO	COFFEE
		VEHICLES	SUGAR
		VEHICLES PARTS	WINES & SPIRITS

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Result Examples

INTRA

Row Labels	Sum of TEUS with HC Factor
ECOA_Caribbean	
Australia_New_Zealand	
2 FAK	138.25
13 COFFEE	73
6 WINES & SPIRITS	37.7
5 FOODSTUFFS	20.35
1 REEFER - OTHER	6
7 MACHINERY	5.2
4 CHEMICALS & RESINS	4
12 SUGAR	3.6
3 FOREST PRODUCTS	2.25
10 REEFER - FROZEN	2.25
Australia_New_Zealand T	292.6
East_Coast_South_America	
2 FAK	1188.8
4 CHEMICALS & RESINS	1081
9 SCRAP	210
5 FOODSTUFFS	80.25
7 MACHINERY	35.55
6 WINES & SPIRITS	32
8 MINERALS & METALS	24
3 FOREST PRODUCTS	16
13 COFFEE	4
1 REEFER - OTHER	3

PACIFIC

ECOA_Caribbean	
North_East_Asia	
3 SCRAP	3416
4 FAK	84
10 FOREST PRODUCTS	4
7 MACHINERY	4
1 FOODSTUFFS	4
2 WINES & SPIRITS	1
North_Europe	
6 REEFER - OTHER	609.3
1 FOODSTUFFS	569
4 FAK	488
11 REEFER - FRESH	466
2 WINES & SPIRITS	175
12 COFFEE	143
8 SUGAR	6
8 CHEMICALS & RESINS	87
3 SCRAP	39
7 MACHINERY	16
9 REEFER - FROZEN	12.9
10 FOREST PRODUCTS	2

ATLANTIC

ECOA_Caribbean	
North_Europe	
4 REEFER - FRESH	20469.95
3 REEFER - OTHER	2749.3
2 FAK	2512.5
6 FOODSTUFFS	1565
8 SCRAP	1116.25
12 COFFEE	945
1 WINES & SPIRITS	724
7 CHEMICALS & RESINS	480
5 FOREST PRODUCTS	318
13 SUGAR	282
9 MACHINERY	221.25
11 REEFER - FROZEN	158.35
10 MINERALS & METALS	113.25

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Proposal

1. Forecast volume and revenue for 3 weeks ahead
2. Exploratory analysis to discover the best model for forecasting
3. Test diverse models and analyze the results
4. Develop guidelines and processes for running the models
5. Run models for selected data (have more impact for MIA RO – NAM LAM for example)
6. Analyze the results and errors

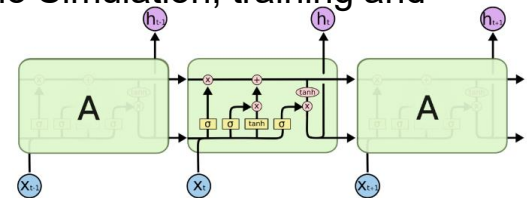
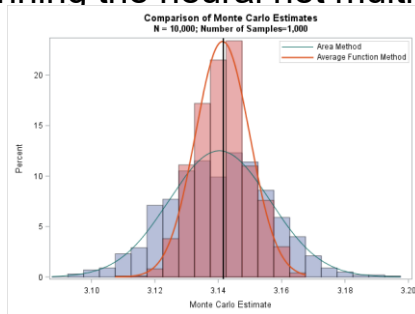
Data Considerations

1. Many changes with the Service Allocation in the past 2 years – inconsistent data.
2. Switching of shipping volume between ports/countries/services (due to prices, seasonality, etc.) – no trend seen.
3. No revenue data with commodities (Not a major issue, since we can forecast broken down into reefer and dry) – Models for volume can be extrapolated to Revenue.
4. Created a model for NAM LAM south bound that can be extrapolated to the other trades.

Suggested Solution: Have an integrated model, where these shifts can be forecasted using macro indicators (rain index, GDP, seasonality, commodity prices, etc.) – Not simple and should take 2-3 months.

Solution

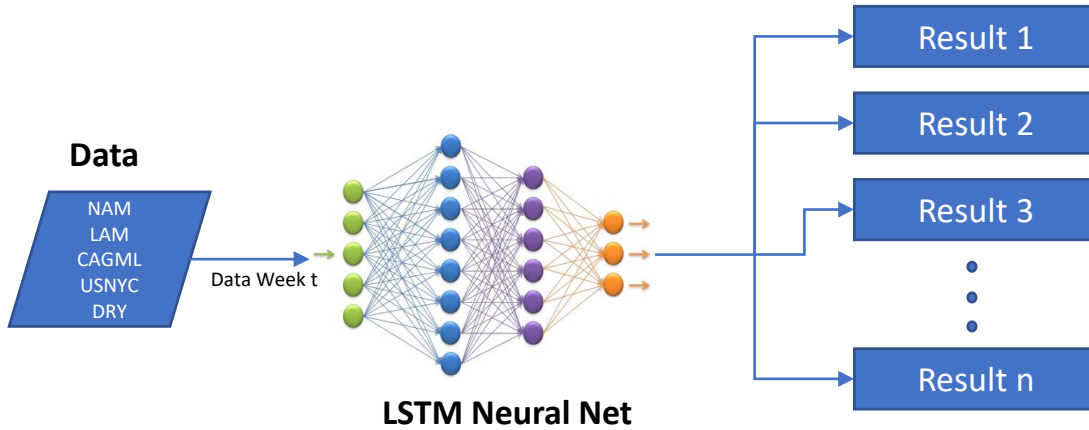
1. The best forecast model for this data is a Recurrent Neural Network (RNN), more specifically a Long Short-Term Memory (LSTM) network, which is a class of RNN. Used in speech recognition, text-to-speech synthesis and Google voice search.
 1. Parameters: Input, output, hidden layers, activation function, iterations.
2. These type of networks learn long sequence of observations – perfect match for time series forecasting. LSTM have loops in them, allowing information to persist.
3. To create a confidence interval for the forecast, we used Monte Carlo Simulation, training and running the neural net multiple times and graphing the results.



The repeating module in an LSTM contains four interacting layers.

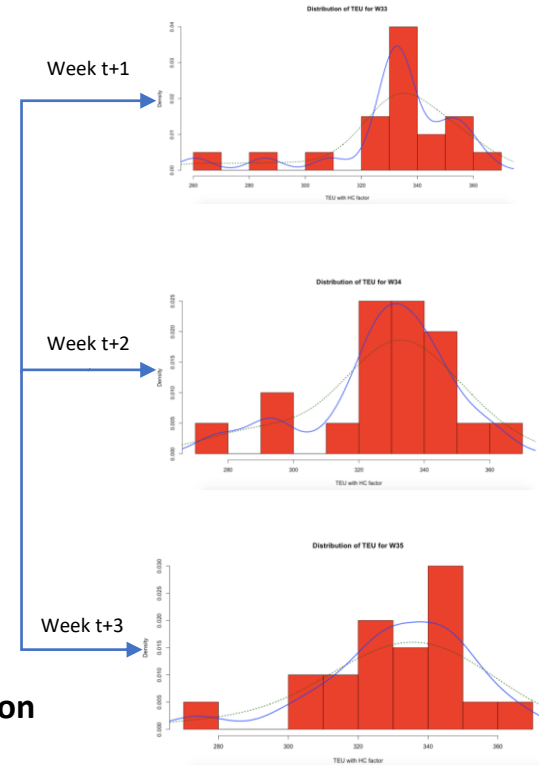
Volume and Revenue Forecast

Process



Monte Carlo Simulation

Distribution of Forecast



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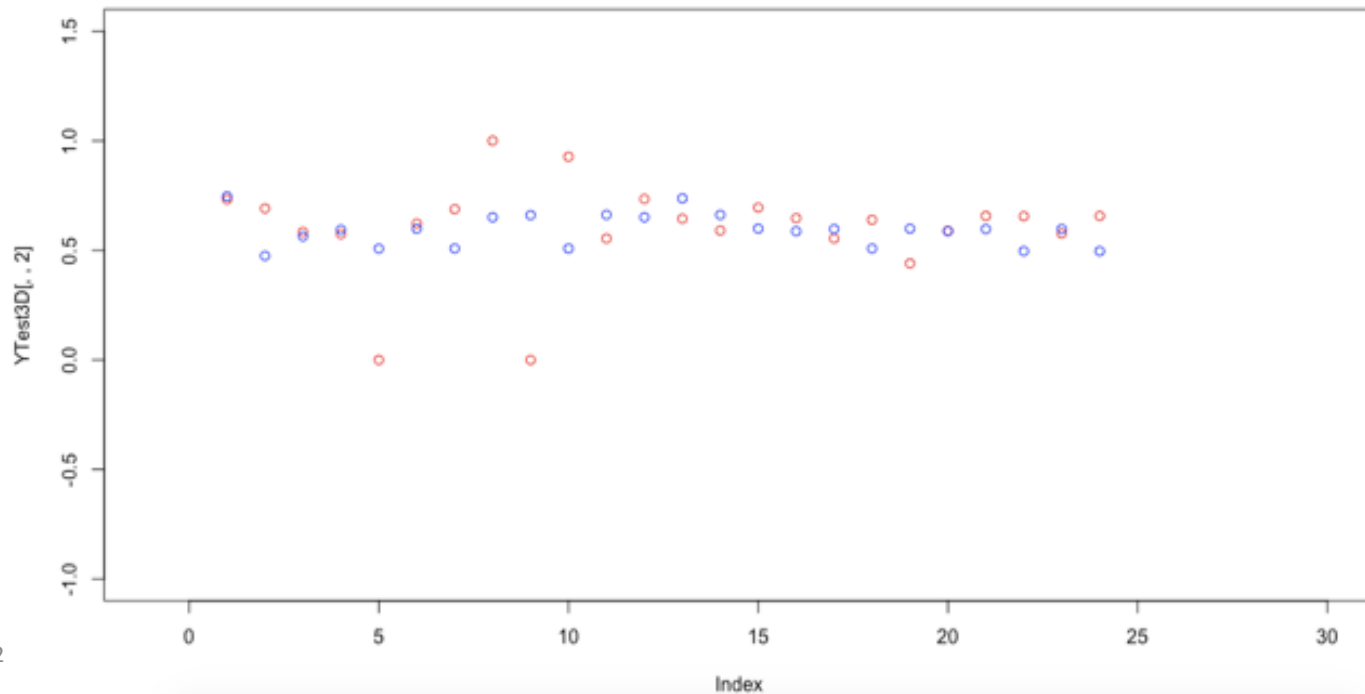
Volume and Revenue Forecast

Results Volume

NAM LAM CAGML USMIA DRY

Training results week 7 to 32

Error: 1.4%

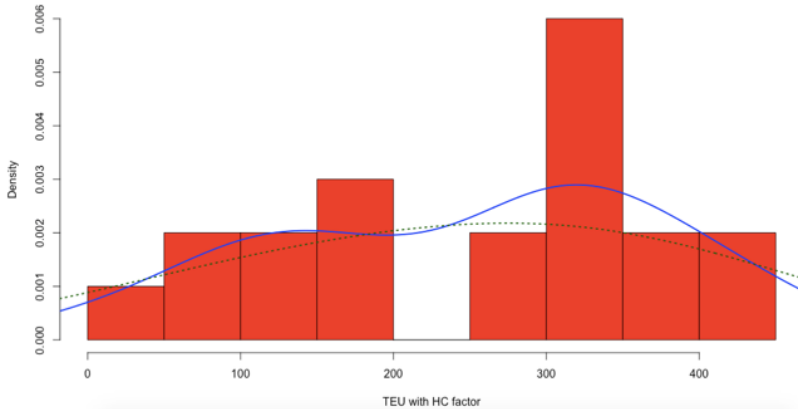


Volume and Revenue Forecast

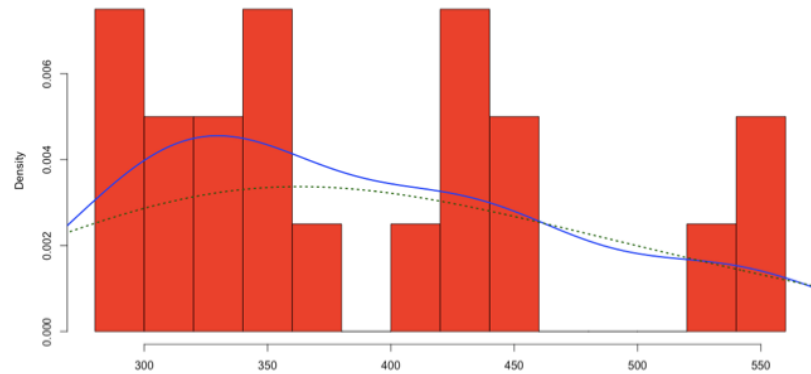
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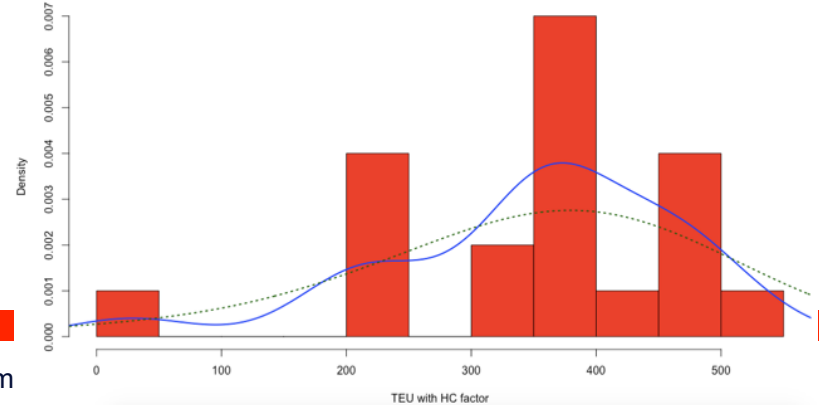
Distribution of TEU for W33



Distribution of TEU for W34



Distribution of TEU for W35



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Volume and Revenue Forecast

Deliverables

1. Volume Forecast Modelling Guidelines
2. Automated R code for Neural Network Models and Monte Carlo Simulation
3. Instructions to run and alter the code according to changes in the model
4. Next steps for Pacific and Atlantic forecast
5. Forecast for the next 3 weeks

Volume and Revenue Forecast

Next Steps

1. Develop an integrated model (2-3 month project, 2 people):
 1. Forecasting volume by country/group of countries
 1. Breaking it down by services and forecast service percentage
 2. Break it down to POL
 2. Explore correlation of volumes with independent variables:
 1. Commodity prices (since there are so many commodities, maybe a commodity price index could be used)
 2. Rain in specific countries
 3. Seasonality (dummy)
 4. GDP
 5. Previous season yield
 6. Autocorrelation
2. Understand what determines shift in volume between countries and ports and model.
3. Model the input and outputs into the RNN and MCS previously shown.
4. Apply to Revenue.

Data Management

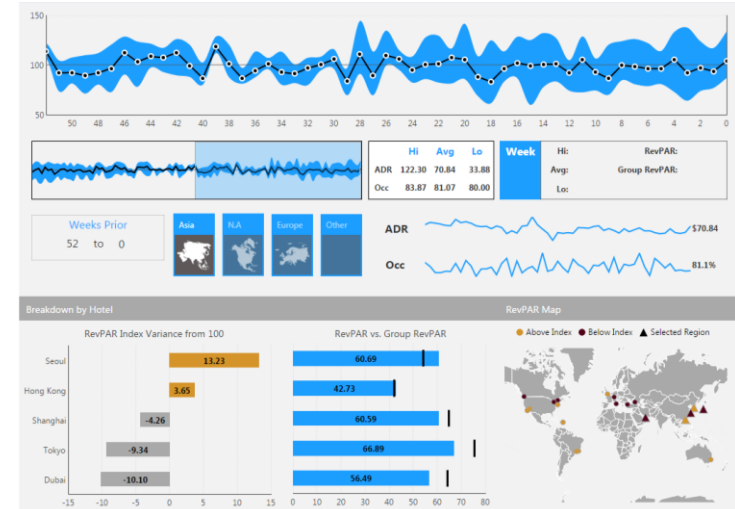
1. Have well defined data guidelines for the whole group – how numbers should be presented and sent upwards (Financial, operation and results reporting)
2. RO's should have independent data centers locally managed, under RO's VP.
 - a. Improves agility, data integrity, accuracy of information, customization for business requirements, reporting and overall efficiency.
 - b. Has internal (Trades, Cargo Flow, Project Cargo, etc.) and external clients (Other RO's, HO, Agencies) (Different reporting, guidelines and interaction)
3. Start implementing experimentally in one/two Regional Offices.

Recommendations

Data Science

1. Develop (in-house) high-end interactive dashboards for Trades, Cargo Flow, Operations and Project Cargo (integrated to the suggestions in the previous slide)
2. Integrate forecast models into the dashboards, with automatic reporting according to guidelines, internal and external
3. Use data science models for optimization in Cargo Flow.

MIA RO TRADE BREAKDOWN



Marketing (Bonus)

1. RO's should have their independent LinkedIn Pages (Different marketing goals and priorities than HO, different business configuration many times)
2. Marketing intense or new lines of business should also have an independent marketing channel with overall guidelines provided by HO or RO.
 - a. Project Cargo Case: Leila posts off her personal LinkedIn Account – a business account for Project Cargo Miami would give her much more visibility/analytics with potential clients.
 - i. Some minor changes on posts increased her views from 5k to 7k, having a social media marketing consultant could exponentially grow the business.

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Tender & Marketing Intern

SHIPPING
THE FUTURE

