ABC – Technical Presentation

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The formation SMART problem statement and it’s problem solving methods.

What opportunities exists for ABC(SME) start up after seeing revenue fallen by 25% during 1sthalf of 2018 compared to 2017 data to bring revenue losses by 0% at the end of 2018 through new product and delivery strategy or closing stores at low revenue?

Customer and Market Strategy

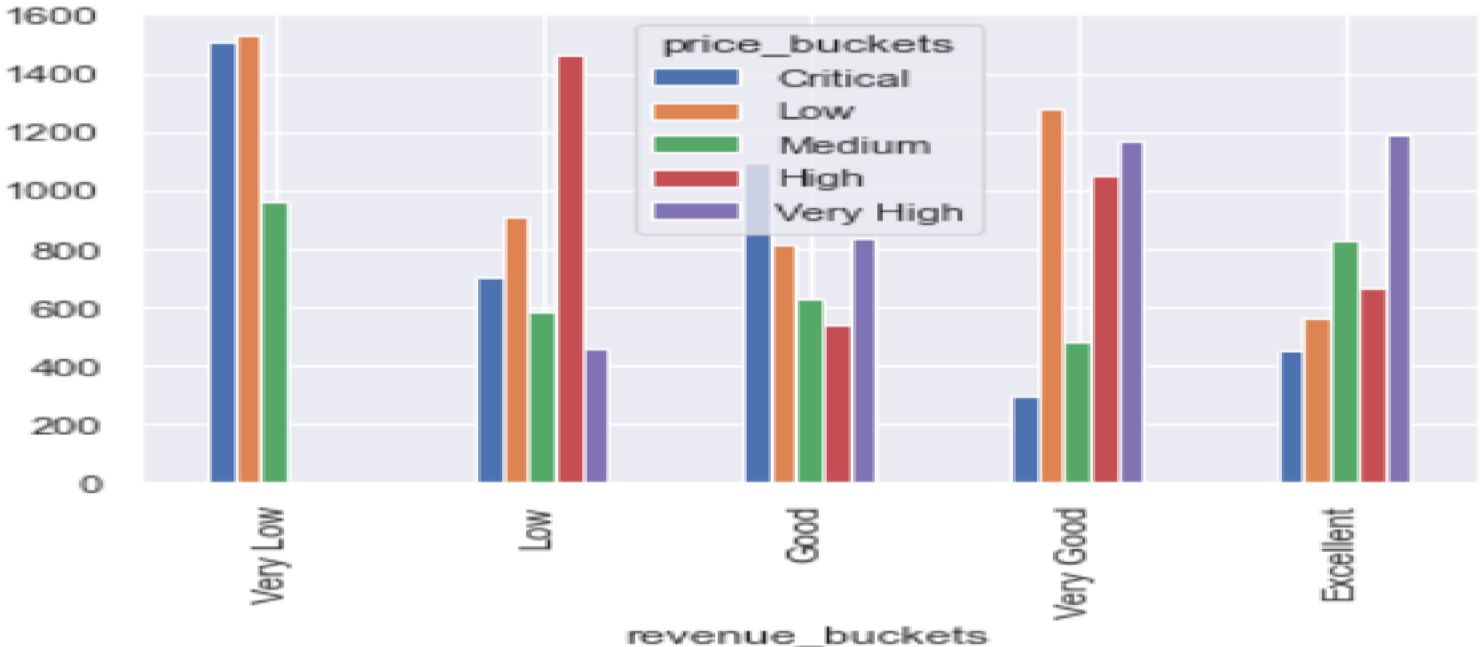
Product Divestment

Cost pressures can be alleviated through the proactive identification of customer demands, with expected decrease in product and delivery issues by 90% over the 2018 calendar year.

! Can we identify the variables that effect revenue in the coming years?	Using effected variables information we can scale a predictive model.
! Can we identify customer's frequent product purchase pattern to increase sales?	Using In stock information we can identify surge in sales of that product and sale it in optimised price.
! Can we identify customer's wish list in advance to make their shopping even more flexible?	Using previous purchase we can build a dedicated page for their upcoming shopping and recommend subsidiary products.

Source: ABC retail data (2014-2018) in Euros currency

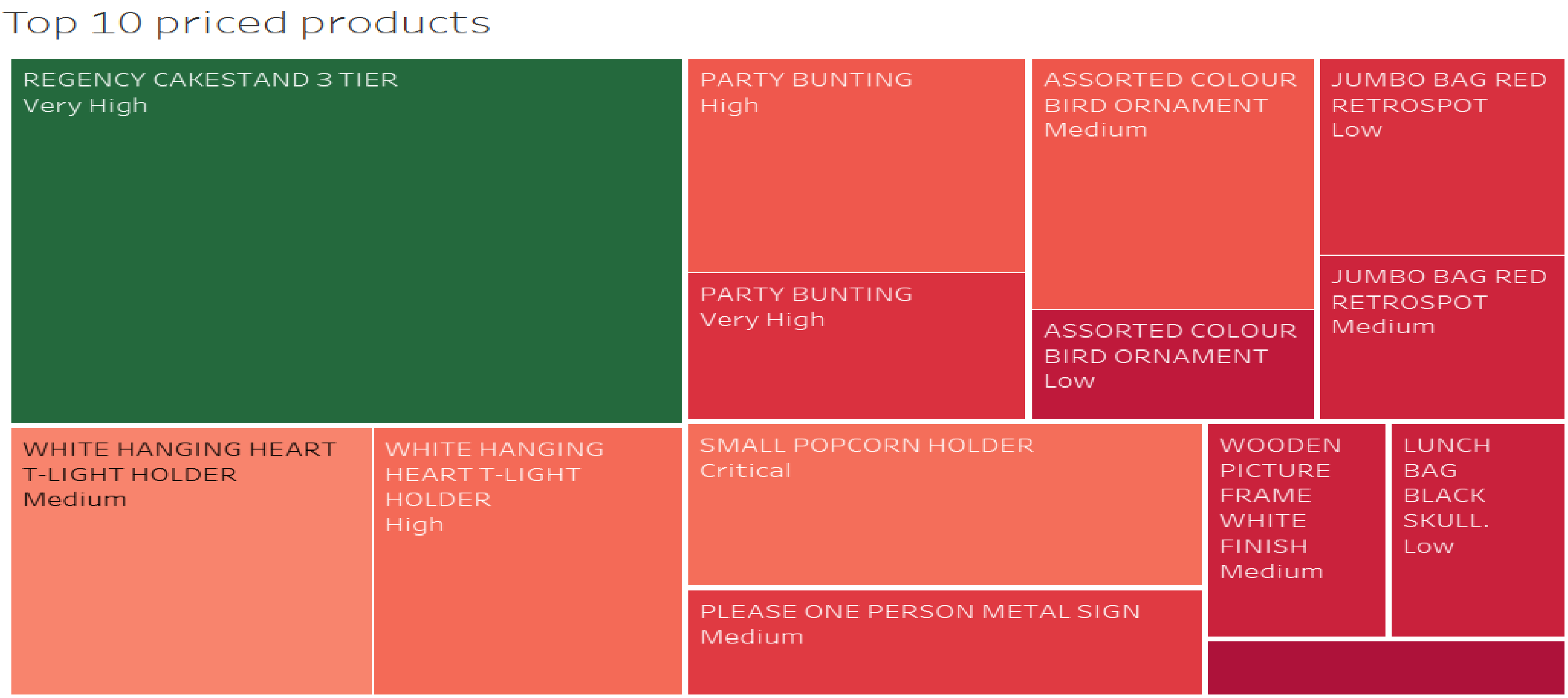
While doing customer segmentation based on revenue and price. We found out almost revenue and price are directly proportional according to their bucket range.



Key Insights

- Revenue buckets [(0.119, 2.58] < (2.58, 5.95] < (5.95, 12.6] < (12.6, 19.8] < (19.8, 3828.0]]
- Price buckets [(0.099, 0.85] < (0.85, 1.65] < (1.65, 2.55] < (2.55, 4.25] < (4.25, 195.0]]
- Interestingly the low priced products brought 50% of revenue with high priced products leading to the best customer segmentation and we need product divestment implementation in best way.

Plotting heat map shows product divestment is succeeded yet revenue forecast value target is not achieved .



Key Insights

- Almost all the products has product divestment (light holder, Party bunder, bird ornaments, bag spots) in price category which is for order purchases and we need to further focus on out of stock, optimised price and recommended products.

Implementation of predictive model to avoid out of stock for the Top 10 products as they make 70% of revenue and analysis is done in UK.

```
X_train = train.drop('Quantity', axis=1).values # Drop the dependent variable
X_test = test.drop('Quantity', axis=1).values   # Drop the dependent variable
y_train = train['Quantity'].values              # Find the dependent variable
y_test = test['Quantity'].values                # Find the dependent variable
```

```
import lightgbm as lgb # Using LightGBM as predictive model
from sklearn.metrics import mean_squared_error # MSE for accuracy

lgb_train = lgb.Dataset(X_train, y_train) # Sending train date
lgb_eval = lgb.Dataset(X_test, y_test, reference=lgb_train) # Sending test data

params = {'task':'train', 'boosting_type':'gbdt', 'objective':'regression',
              'metric': {'rmse'}, 'num_leaves': 10, 'learning_rate': 0.05,
              'feature_fraction': 0.8, 'max_depth': 5, 'verbose': 0,
              'num_boost_round':20000, 'early_stopping_rounds':5000, 'nthread':-1} # setting model parameters

gbm = lgb.train(params,
                lgb_train,
                num_boost_round=20,
                valid_sets=lgb_eval,
                early_stopping_rounds=5) # sending values to models

# predict
y_pred = gbm.predict(X_test, num_iteration=gbm.best_iteration) # predict using test
# eval
print('The rmse of prediction is:', mean_squared_error(y_test, y_pred) ** 0.5) # RMSE for accuracy
```

```
The rmse of prediction is: 309.637776991945
```

Key Insights

```
# Array:Description,Country,UnitPrice,revenue_buckets,price_buckets,final_revenue,dayofmonth,dayofyear,dayofweek,month,
# year,weekofyear
X_prediction=np.array([[1,1,3,4,5,16,7,8,9,11,2018,30]]) # new values
predictions = gbm.predict(X_prediction) # predictive function
predictions # display 'Quantity'value
```

```
array([121.37791008])
```

Implementation of predictive model to avoid over pricing for the Top 10 products as they make 70% of revenue and analysis is done in UK.

```
X_train = train.drop('UnitPrice', axis=1).values  # Drop the dependent variable
X_test = test.drop('UnitPrice', axis=1).values    # Drop the dependent variable
y_train = train['UnitPrice'].values               # Find the dependent variable
y_test = test['UnitPrice'].values                 # Find the dependent variable
```

```
from sklearn.neighbors import KNeighborsClassifier # Importing predictive model function
from sklearn.metrics import mean_squared_error     # MSE for model accuracy

KNN_model= KNeighborsClassifier(n_neighbors=5)     # Setting model parameters
KNN_model.fit(X_train,y_train)


# predict
y_pred = KNN_model.predict(X_test)                  # Predict the test data
# eval
print('The rmse of prediction is:', mean_squared_error(y_test, y_pred) ** 0.5)  # RMSE for accuracy
```

```
The rmse of prediction is: 4.460941604639093
```

Key Insights

```
# Array format:Description,Country,Quantity,revenue_buckets,price_buckets,final_revenue,dayofmonth,dayofyear,dayofweek,
# month,year,weekofyear
X_prediction=np.array([[1,1,121,4,5,16,7,8,9,11,2018,30]]) # new data
predictions = KNN_model.predict(X_prediction) # predictive function
predictions # display optimised price
```

```
array([2], dtype=int64)
```

Introducing items brought together category to upsell the products with discounts from optimized price calculations in UK.

	antecedents	consequents	antecedent support	consequent support	support	confidence	lift	leverage	conviction
2	(HEART OF WICKER LARGE)	(HEART OF WICKER SMALL)	0.054526	0.058888	0.030534	0.560000	9.509630	0.027323	2.138892
3	(HEART OF WICKER SMALL)	(HEART OF WICKER LARGE)	0.058888	0.054526	0.030534	0.518519	9.509630	0.027323	1.963678
6	(LUNCH BAG RED RETROSPOT)	(LUNCH BAG BLACK SKULL.)	0.052345	0.067612	0.031625	0.604167	8.935820	0.028086	2.355507
8	(LUNCH BAG SPACEBOY DESIGN)	(LUNCH BAG BLACK SKULL.)	0.042530	0.067612	0.031625	0.743590	10.997932	0.028749	3.636314
16	(WOODEN PICTURE FRAME WHITE FINISH)	(WOODEN FRAME ANTIQUE WHITE)	0.062159	0.043621	0.034896	0.561404	12.870175	0.032185	2.180545
17	(WOODEN FRAME ANTIQUE WHITE)	(WOODEN PICTURE FRAME WHITE FINISH)	0.043621	0.062159	0.034896	0.800000	12.870175	0.032185	4.689204

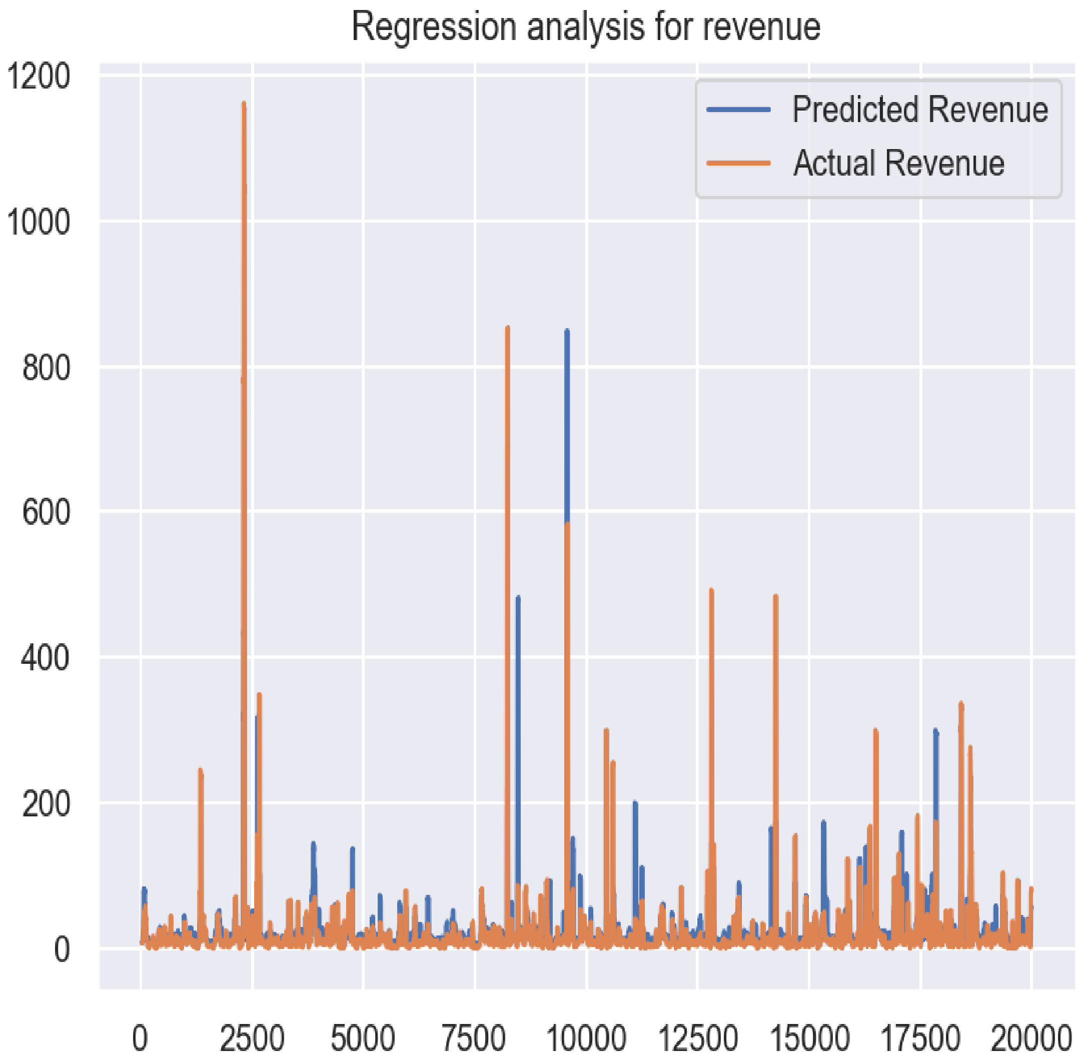
Key Insights

- Lift
- Confidence

```
rules[ (rules['lift'] >=5) &
       (rules['confidence'] >= 0.5) ] # Filtering desired outputs
```

- UK's recommended items brought together products are Wicker, Retro spot and wooden frames.

Building a predictive analytics model for revenue using linear regression.



Model Parameters

Dep. Variable:	final_revenue
Model:	OLS
Method:	Least Squares
R-squared:	0.447
Adj. R-squared:	0.447
F-statistic:	3234.
Prob (F-statistic):	0.00

Source: Southern Water Corp Statistical Records