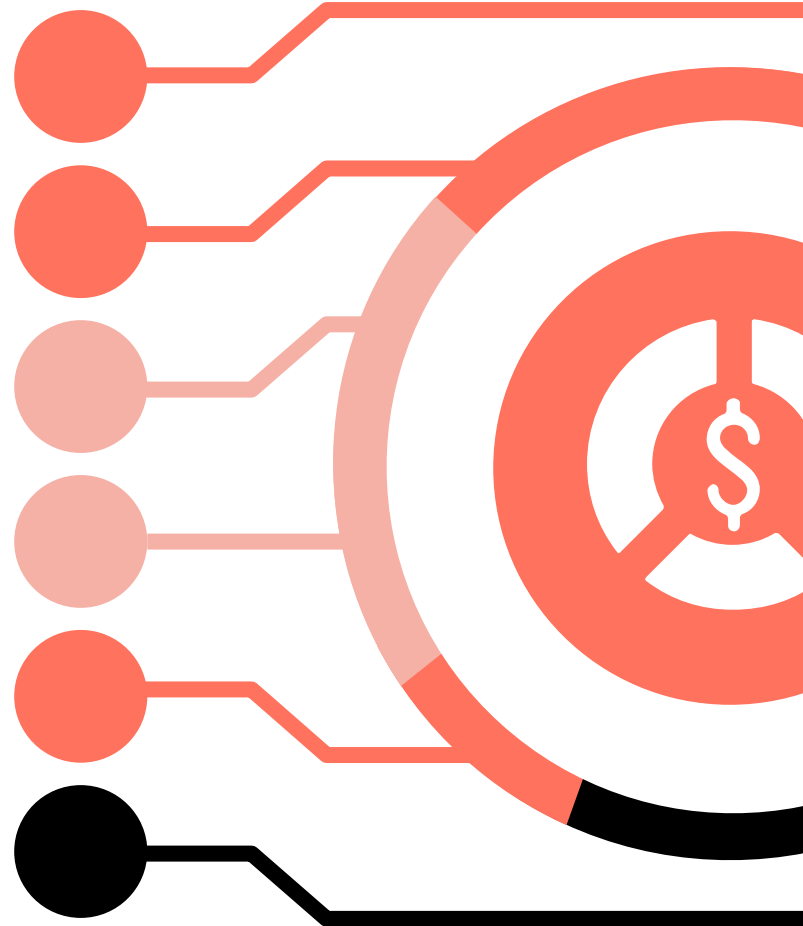# CUSTOMER LOYALTY PROGRAM BASED ON SEGMENTATION

using Customer Lifetime Value (CLV) Method

Winda Aprilia K. Putri

BUSINESS BACKGROUND

Importance of Customer Segmentation

- As business grows, company will have larger customer base with various characteristic

- Effective marketing strategies and better use of marketing budget

Customer Segmentation Types

Geographics (country, city, language)

Demographics (age, gender, income)

Psychographics (lifestyle, concern, values)

Behavioral (purchase, usage, life cycle stage)

ONLINE RETAIL II DATA SET UCI

- Transactions of a UK-based online retail between 01/12/2010 and 09/12/2011.

- Mainly sells unique all-occasion gift-ware.

- https://archive.ics.uci.edu/ml/datasets/Online+Retail+II

- Behavioral segmentation will be used

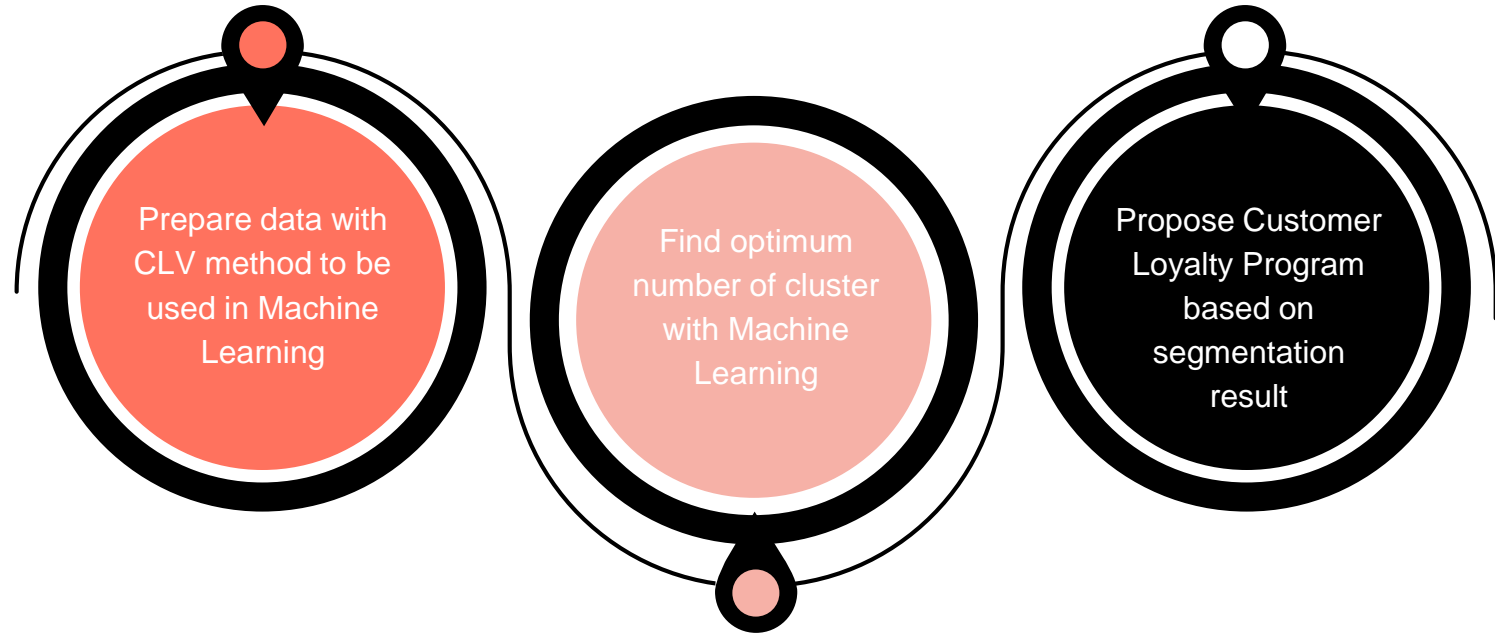|	Invoice	StockCode	Description	Quantity	InvoiceDate	Price	CustomerID	Country
0	536365	85123A	WHITE HANGING HEART T-LIGHT HOLDER	6	2010-12-01 08:26:00	2.55	17850.0	United Kingdom
1	536365	71053	WHITE METAL LANTERN	6	2010-12-01 08:26:00	3.39	17850.0	United Kingdom
2	536365	84406B	CREAM CUPID HEARTS COAT HANGER	8	2010-12-01 08:26:00	2.75	17850.0	United Kingdom
3	536365	84029G	KNITTED UNION FLAG HOT WATER BOTTLE	6	2010-12-01 08:26:00	3.39	17850.0	United Kingdom
4	536365	84029E	RED WOOLLY HOTTIE WHITE HEART.	6	2010-12-01 08:26:00	3.39	17850.0	United Kingdom
...	...	...	...	...	...	...	...	...
541905	581587	22899	CHILDREN'S APRON DOLLY GIRL	6	2011-12-09 12:50:00	2.10	12680.0	France
541906	581587	23254	CHILDRENS CUTLERY DOLLY GIRL	4	2011-12-09 12:50:00	4.15	12680.0	France
541907	581587	23255	CHILDRENS CUTLERY CIRCUS PARADE	4	2011-12-09 12:50:00	4.15	12680.0	France
541908	581587	22138	BAKING SET 9 PIECE RETROSPOT	3	2011-12-09 12:50:00	4.95	12680.0	France
541909	581587	POST	POSTAGE	1	2011-12-09 12:50:00	18.00	12680.0	France

541910 rows × 8 columns
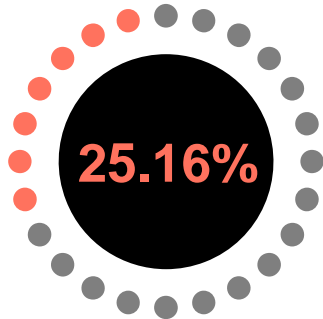
CUSTOMER LIFTIME VALUE (CLV) METHOD

- Customer lifetime value for a firm is the net profit or loss to the firm from a customer over the entire life of transactions of that customer with the firm (Jain & Singh, 2002)

- Components of CLV (Kumar, 2004)

  ○ Time horizon

  ○ Purchase frequency

  ○ Sales contribution

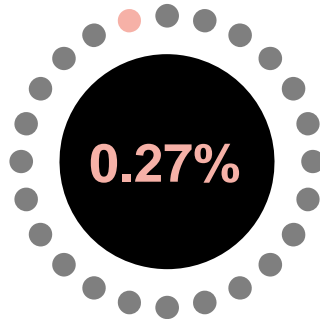 ○ Marketing cost

OBJECTIVES

Prepare data with CLV method to be used in Machine Learning

Find optimum number of cluster with Machine Learning

Propose Customer Loyalty Program based on segmentation result

DATA PRE-PROCESSING

Missing Value

25.16%

`CustomerID`

The percentage is quite big but it cannot be replaced with any metric value so it will be removed.

0.27%

`Description`

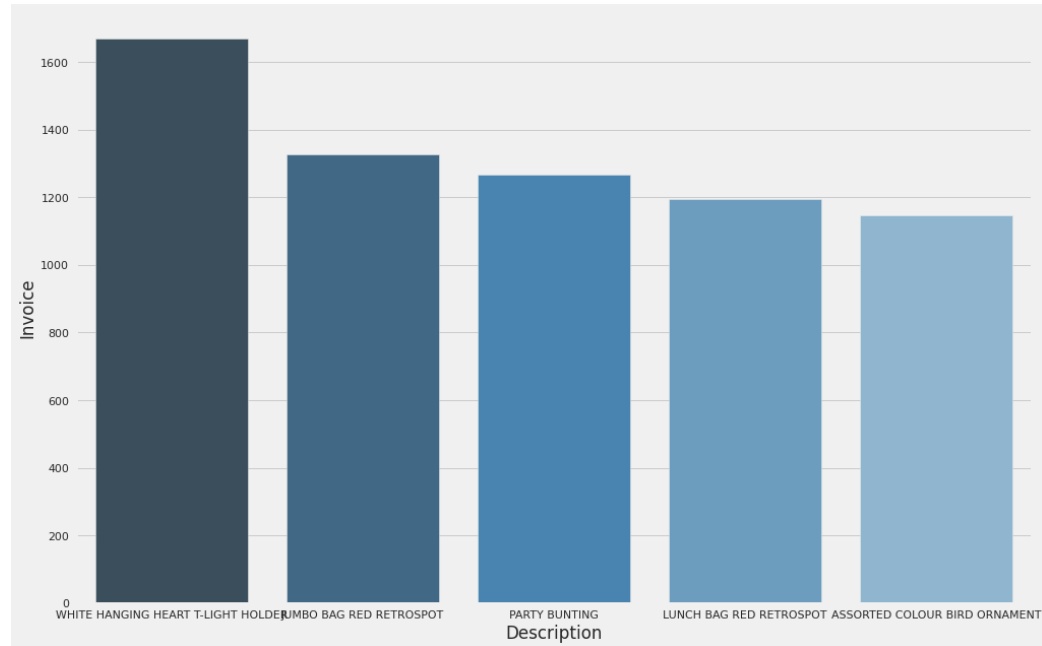The percentage is small so it will also be removed from the dataset.

Duplication

5268 duplicated rows will be removed from the dataset

Outliers

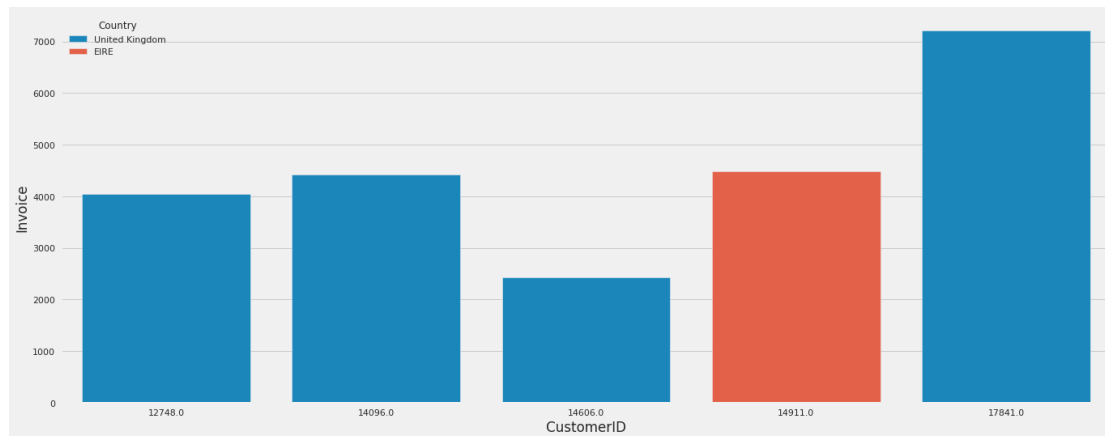IQR treatment will be applied to outlier values in `Quantity` and `Price`.
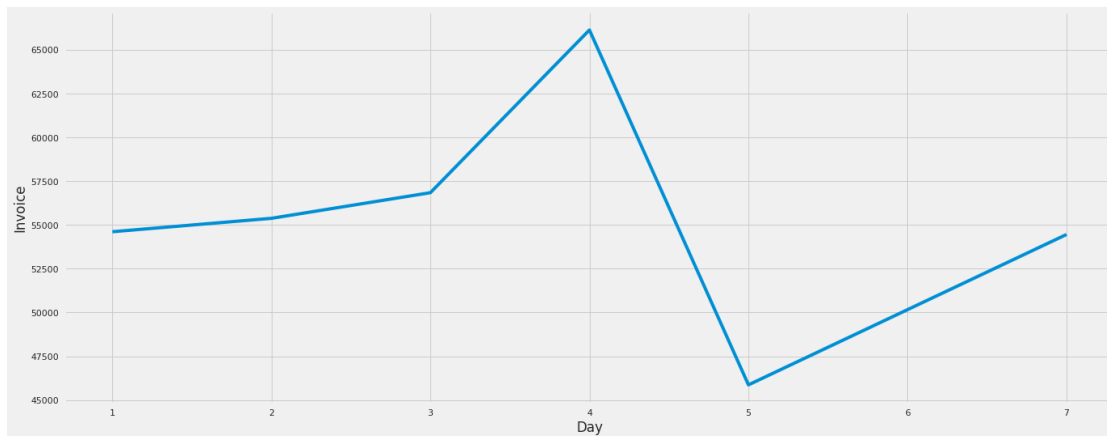
DATA
EXPLORATION

- Most frequently purchased products

DATA
EXPLORATION

- Most frequent buyer

DATA
EXPLORATION

- Total invoices per day

FEATURE ENGINEERING

Invoice	StockCode	Description	Quantity	InvoiceDate	Price	CustomerID	Country
536365	85123A	WHITE HANGING HEART T-LIGHT HOLDER	6	2010-12-01 08:26:00	2.55	17850.0	United Kingdom
536365	71053	WHITE METAL LANTERN	6	2010-12-01 08:26:00	3.39	17850.0	United Kingdom
536365	84406B	CREAM CUPID HEARTS COAT HANGER	8	2010-12-01 08:26:00	2.75	17850.0	United Kingdom
536365	84029G	KNITTED UNION FLAG HOT WATER BOTTLE	6	2010-12-01 08:26:00	3.39	17850.0	United Kingdom
536365	84029E	RED WOOLLY HOTTIE WHITE HEART.	6	2010-12-01 08:26:00	3.39	17850.0	United Kingdom

- Data on the left is raw data.
- This project objective is to find customer segmentation, so feature engineering is needed to capture information for each customer, not invoice.
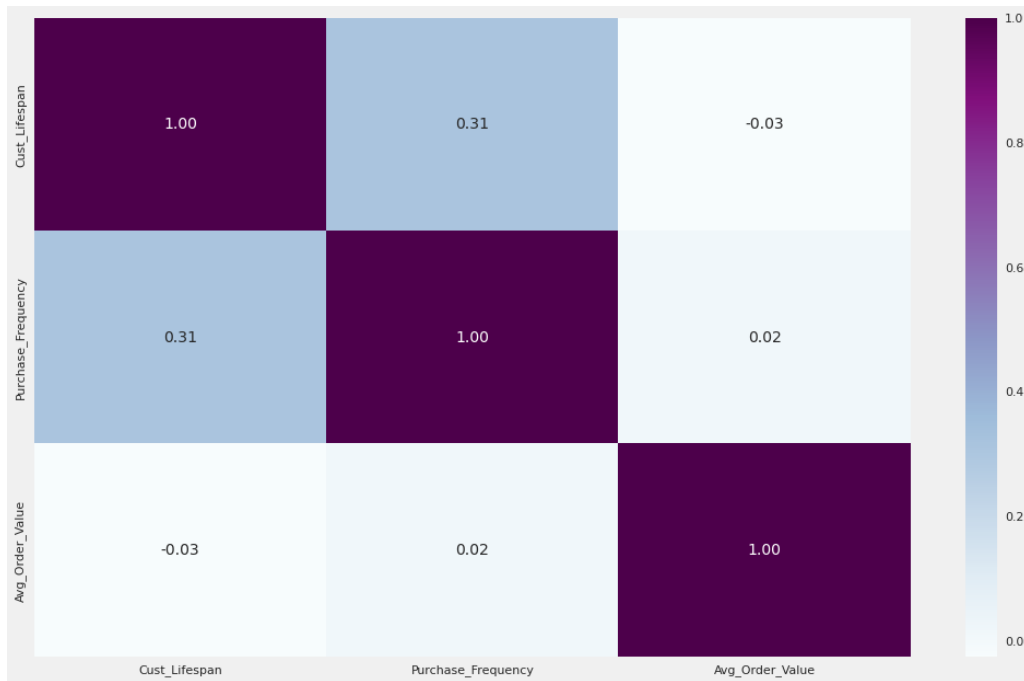
FEATURE ENGINEERING

- Components of CLV (Kumar, 2004)

  ○ Time horizon

  ○ Purchase frequency

  ○ Sales contribution

  ○ Marketing cost

- New Features

  ○ `Customer Lifespan`

  ○ `Purchase Frequency`

  ○ `Average Order Value`

- Assumption: cost to attract each customer is considered the same (equal)

CORRELATION MATRIX

There is no redundancy among selected features

MODELING

Finding the best number of cluster (k) with K-Means Clustering

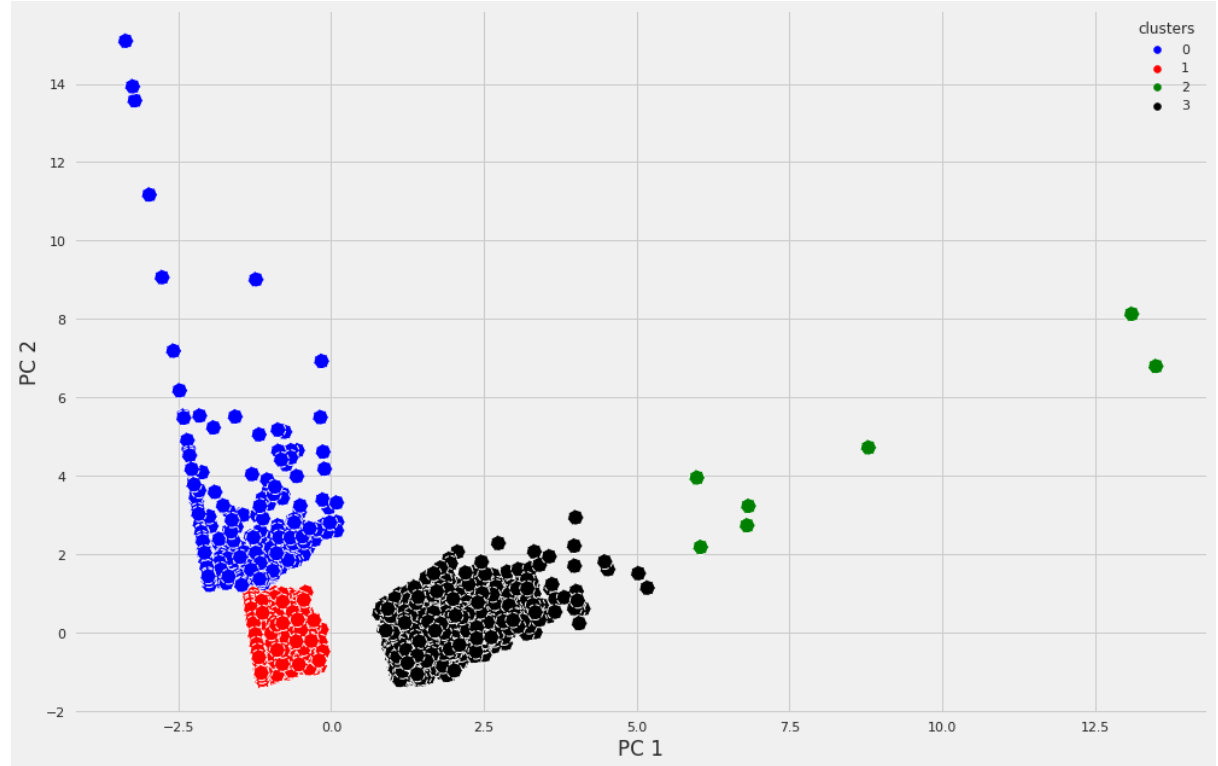Distortion Score Elbow for KMeans Clustering

DIMENSIONALITY REDUCTION

PCA technique is used to reduce feature dimension.

From scatter plot generated after PCA, there is no overlapping in each cluster characteristic.

Can be stated that the number of cluster generated from K-Means clustering is acceptable.

CLUSTER CHARACTERISTIC

Median is used in aggregation because distribution is left-skewed

	CUSTOMER LIFESPAN (MEDIAN)	PURCHASE FREQUENCY (MEDIAN)	AVERAGE ORDER VALUE (MEDIAN)	NUMBER OF USER
CLUSTER 0	75.0	2.0	667.7	296
CLUSTER 1	0.0	1.0	171.2	2322
CLUSTER 2	372.0	91.0	194.7	7
CLUSTER 3	276.0	5.0	217.0	1567

MODEL
INTERPRETATION

- Clustering result is plotted on a scatter plot to give better view in interpreting data.
- According to Reinatz & Kumar (2002), there are 4 types of loyal customers:
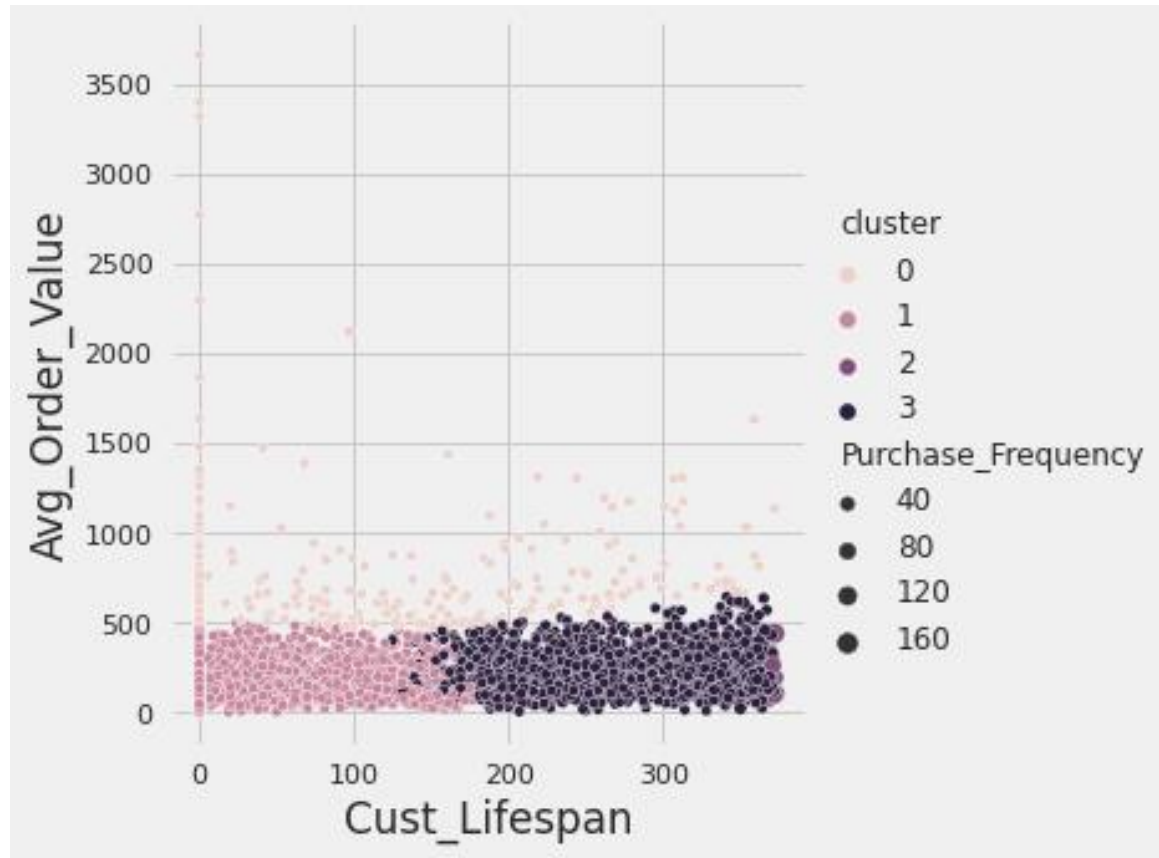
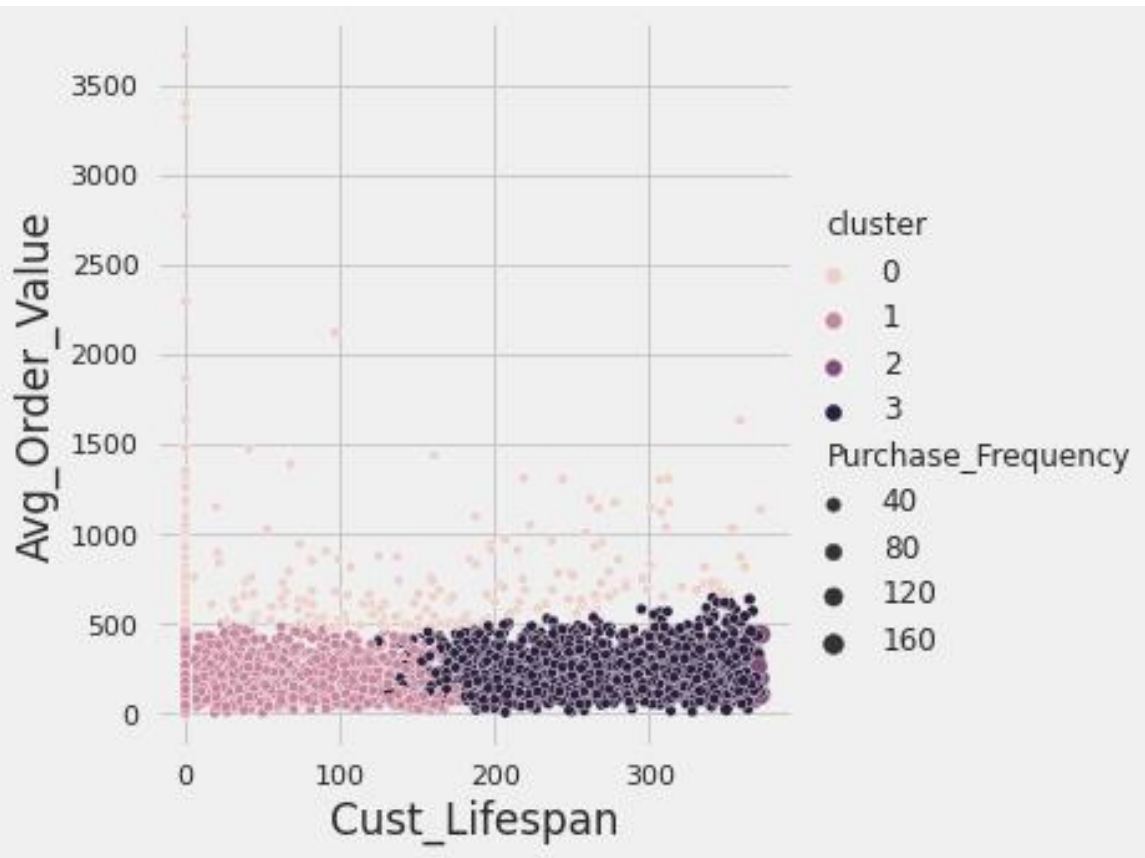# MODEL
INTERPRETATION

Cluster 0

Butterflies

Cluster 1
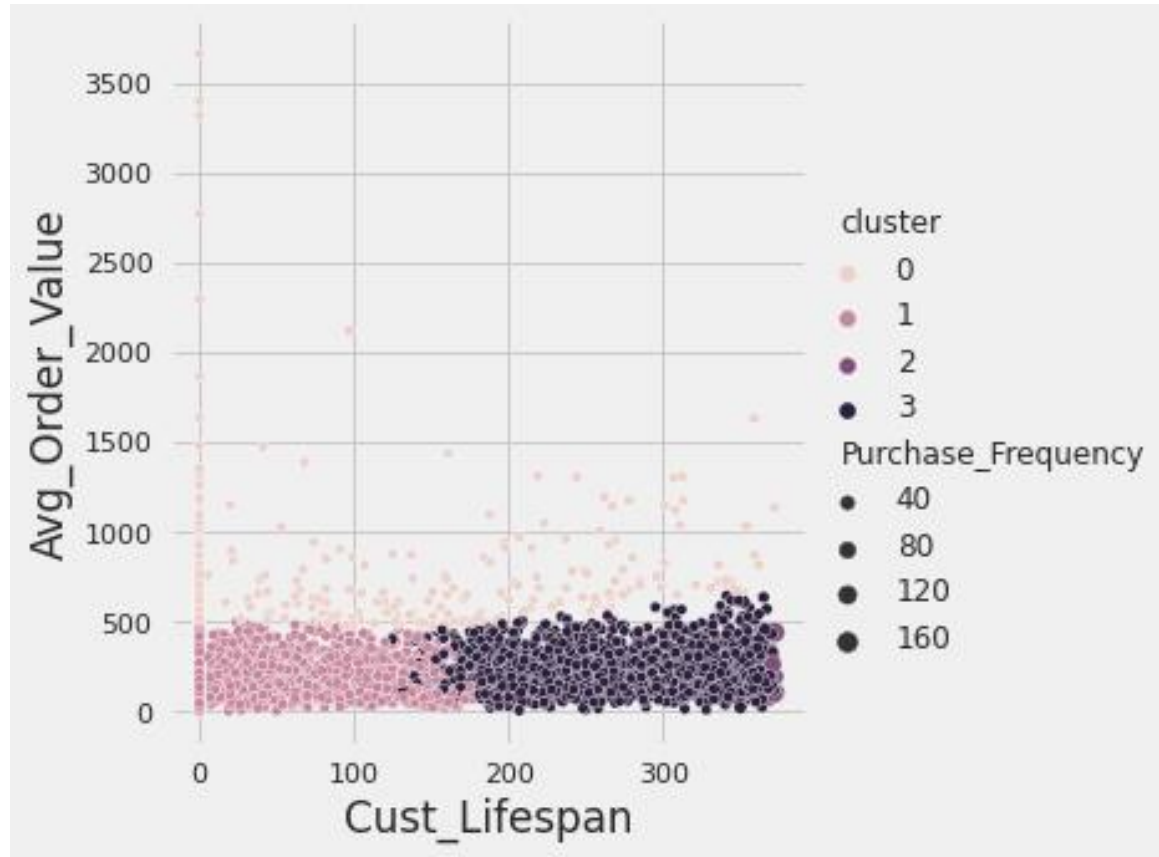
Strangers

Cluster 2

True Friends

Cluster 3

Barnacles

MODEL
INTERPRETATION

Cluster 0

- Butterflies are not particularly loyal, but have brought in good revenue
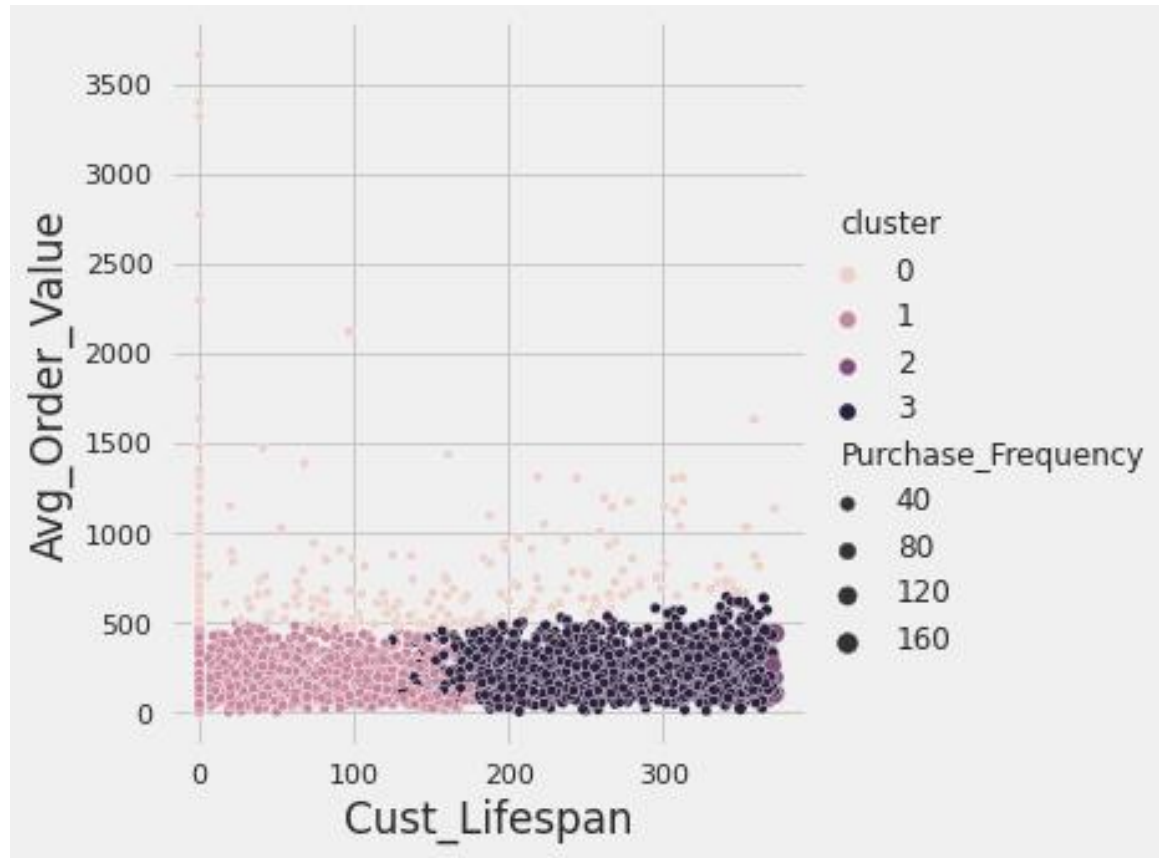- In this dataset, majority are distributor/wholesaler
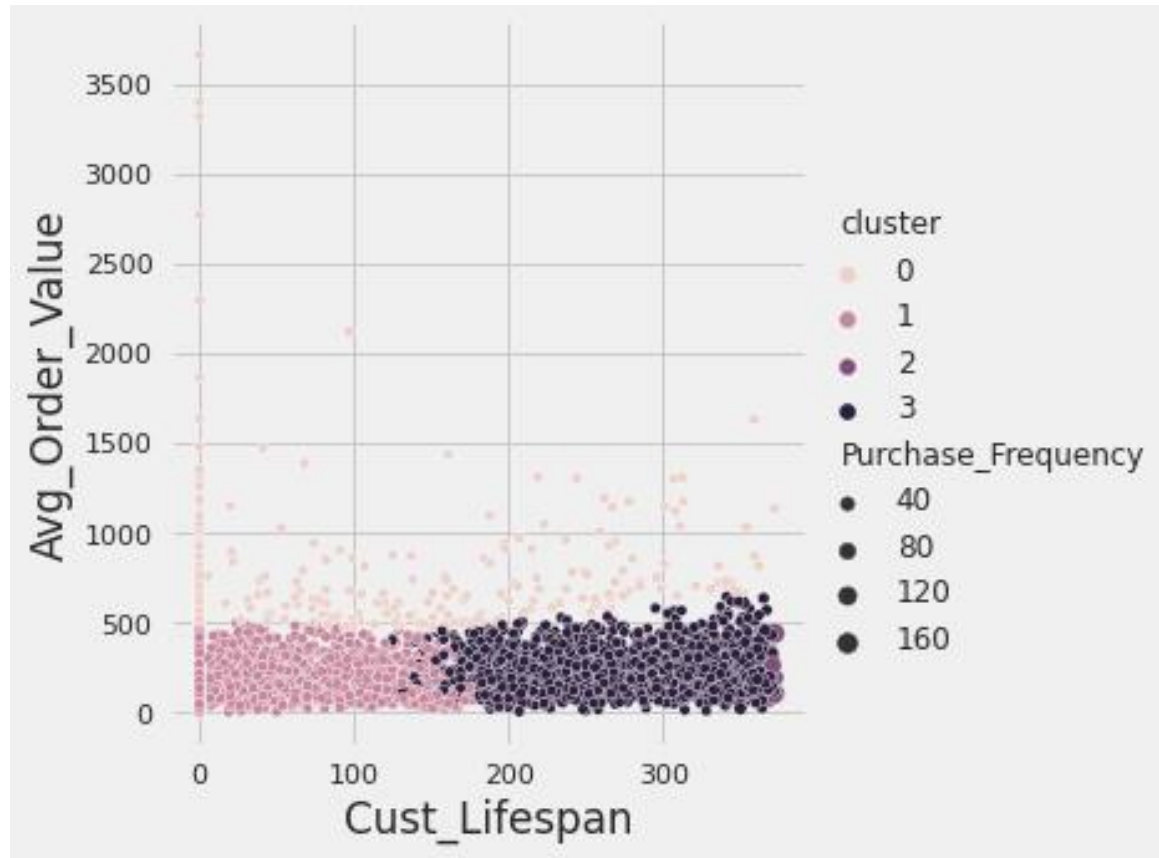
MODEL
INTERPRETATION

Cluster 1

- Strangers are those that barely bring in any revenue and are not yet loyal to company
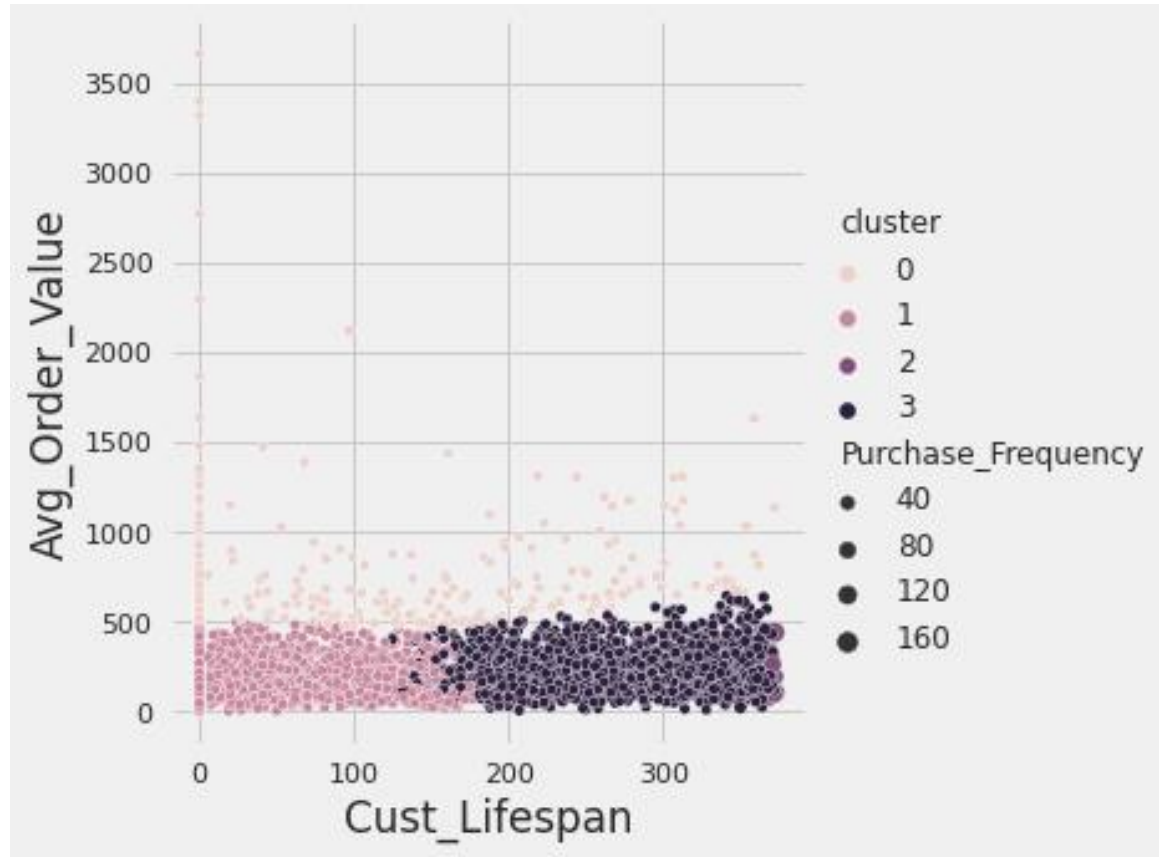
MODEL
INTERPRETATION

Cluster 2

- True friends are customers that not only bring in profit, but also a loyalist.

MODEL INTERPRETATION

Cluster 3

- Barnacles are loyal customers that rarely make a purchase, and may not bring in much of a profit.

CUSTOMER LOYALTY PROGRAM PROPOSAL

Paid Program for Butterflies

Immediate benefit once customer pay certain amount.

Tier Program for True Friends

Customer will get different benefts depending on their rank/tier.

Non-Monetary Program for Strangers

Minimize investment in these customers.

Points Program for Barnacles

Earn point through leaving reviews etc.

BUSINESS IMPACT

- Assumption: The loyalty program costs company $1 for every customer.
- In this project, there is total of $2322 that can be reduced or 56% lower than not using customer segmentation.

Marketing Cost

Before Customer Segmentation

After Customer Segmentation

0   1000   2000   3000   4000   5000

■ Cluster 0   ■ Cluster 1   ■ Cluster 2   ■ Cluster 3
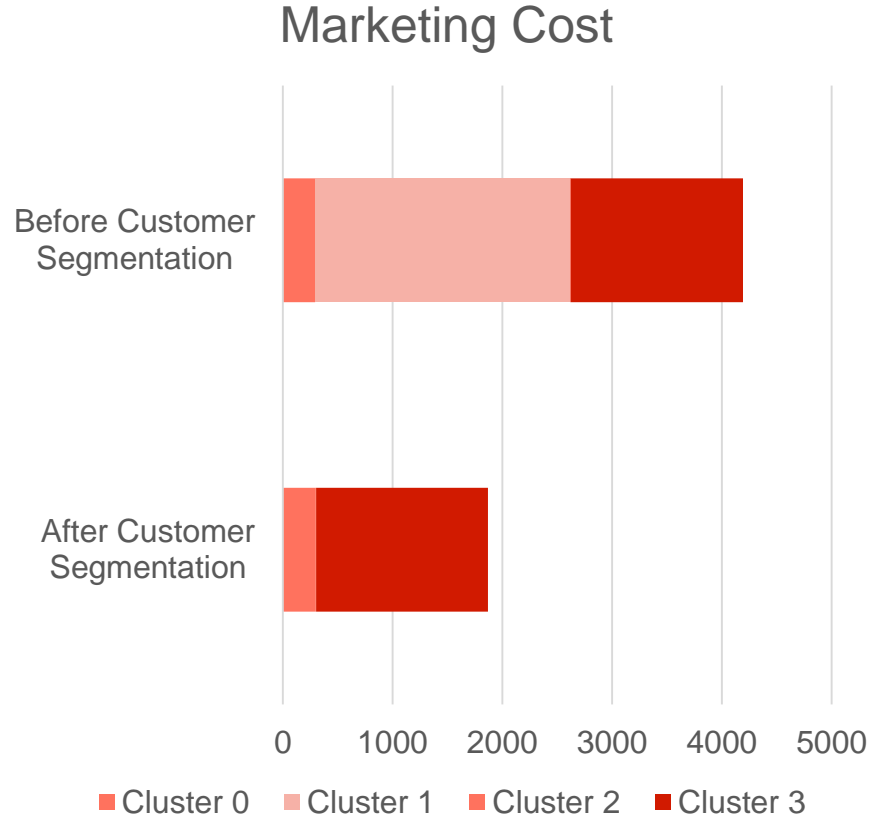
THANK YOU

Do you have any questions?

References

Jain, D & Singh, S.S. (2002). Customer Lifetime Value Research In Marketing: A Review and Future Direction. Journal Of Interactive Marketing, Spring, 16, 34–46.

Kumar, R. (2004). Customer Lifetime Value Framework For Customer Selection and Resource Allocation Strategy. Journal of Marketing, 68, 106–126.

Reinartz, W & Kumar, V. (2002). The Mismanagement Of Customer Loyalty. Harvard Business Review, 80, 86–125.