Recommendation System for Retail

Recommendation algorithms provide an effective form of targeted marketing by creating a personalized shopping experience for each customer.

A recommendation engine filters the data using different algorithms and recommends the most relevant items to users. It first captures the past behaviour of a customer and based on that, recommends products which the users might likely buy.

While e-commerce businesses have the easiest vehicles for personalization, the technology's increased conversion rates as compared with traditional broad-scale approaches will also make it compelling to offline
retailers for use in postal mailings, coupons, and other forms of customer communication.

Objective and Goal
Understand customers better with market basket analysis with data mining and association rules to drive revenue
Increase Sales - identify new opportunities for cross selling and upselling the products
Drive marketing campaign - target customer who but milk with offer on eggs to encourage them to shop more. Send email or display ads.
Assortment arrangement - improve customer shopping experience

Marketing Tip -
Place popular item + high margin item on display

Dataset
We will use the online retail dataset available on the UCI weblink.
https://archive.ics.uci.edu/ml/datasets/online+retail

Snapshot of the data

	InvoiceNo	StockCode	Description	Quantity	InvoiceDate	UnitPrice	CustomerID	Country
1	InvoiceNo	StockCode	Description	Quantity	InvoiceDate	UnitPrice	CustomerID	Country
2	536365	85123A	WHITE HANGING HEA	6	01/12/10 8:26	2.55	17850	United Kingdom
3	536365	71053	WHITE METAL LANTER	6	01/12/10 8:26	3.39	17850	United Kingdom
4	536365	84406B	CREAM CUPID HEARTS	8	01/12/10 8:26	2.75	17850	United Kingdom
5	536365	84029G	KNITTED UNION FLAG	6	01/12/10 8:26	3.39	17850	United Kingdom
6	536365	84029E	RED WOOLLY HOTTIE	6	01/12/10 8:26	3.39	17850	United Kingdom
7	536365	22752	SET 7 BABUSHKA NEST	2	01/12/10 8:26	7.65	17850	United Kingdom
8	536365	21730	GLASS STAR FROSTED	6	01/12/10 8:26	4.25	17850	United Kingdom
9	536366	22633	HAND WARMER UNIO	6	01/12/10 8:28	1.85	17850	United Kingdom
10	536366	22632	HAND WARMER RED P	6	01/12/10 8:28	1.85	17850	United Kingdom
11	536367	84879	ASSORTED COLOUR BI	32	01/12/10 8:34	1.69	13047	United Kingdom
12	536367	22745	POPPY'S PLAYHOUSE E	6	01/12/10 8:34	2.1	13047	United Kingdom
13	536367	22748	POPPY'S PLAYHOUSE K	6	01/12/10 8:34	2.1	13047	United Kingdom
14	536367	22749	FELTCRAFT PRINCESS (	8	01/12/10 8:34	3.75	13047	United Kingdom
15	536367	22310	IVORY KNITTED MUG (	6	01/12/10 8:34	1.65	13047	United Kingdom

Approach
We gather insights into the shopping pattern of the customers by doing an exploratory data analysis followed by running supervised machine learning models on the datasets. Recommendation systems play an important role in helping users find products and content they care about.

Recommender Function

Behind the scenes, these systems are powered by a recommender function. A recommender function takes in information about the user and predicts the rating the user would give the product.

Start by finding a set of customers whose purchased items overlap the user's purchased items. The algorithm aggregates items from these similar customers, eliminates items the user has already purchased, and recommends the remaining items to the user. Two popular versions of these algorithms are collaborative filtering and cluster models. Other algorithms — including search-based methods and item-to-item collaborative filtering — focus on finding similar items, not similar customers. For each of the user's purchased and rated items, the algorithm attempts to find similar items.
It then aggregates the similar items and recommends them.

Recommendation Algorithms
Use Association rules and Apriori algorithm to do market basket analysis.
Models which will be used and evaluated during the model building -
1. Linear Regression
2. Naive Bayes - Confidence and Lift metric for Recommendation system uses conditional probability
3. Choose Neighbours
   - Clustering
   - KNN
4. Explore Ensemble techniques

Model Evaluation
Evaluation metrics will include Support, Confidence and Lift factors besides recall, precision, RMSE metrics.