

# Retail-analytics

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Machine learning methods can be used for a variety of different use cases such as product recommendations, churn predictions, logistics planning and automatic personalized marketing. There are quite a few more use cases that I'll let your imagination come up with.

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- weekday, time of a day
- IP address -> geolocation
- browser data (mobile or desktop? which internet browser?)
- behavioral data (how do they browse our website)

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Personalized marketing

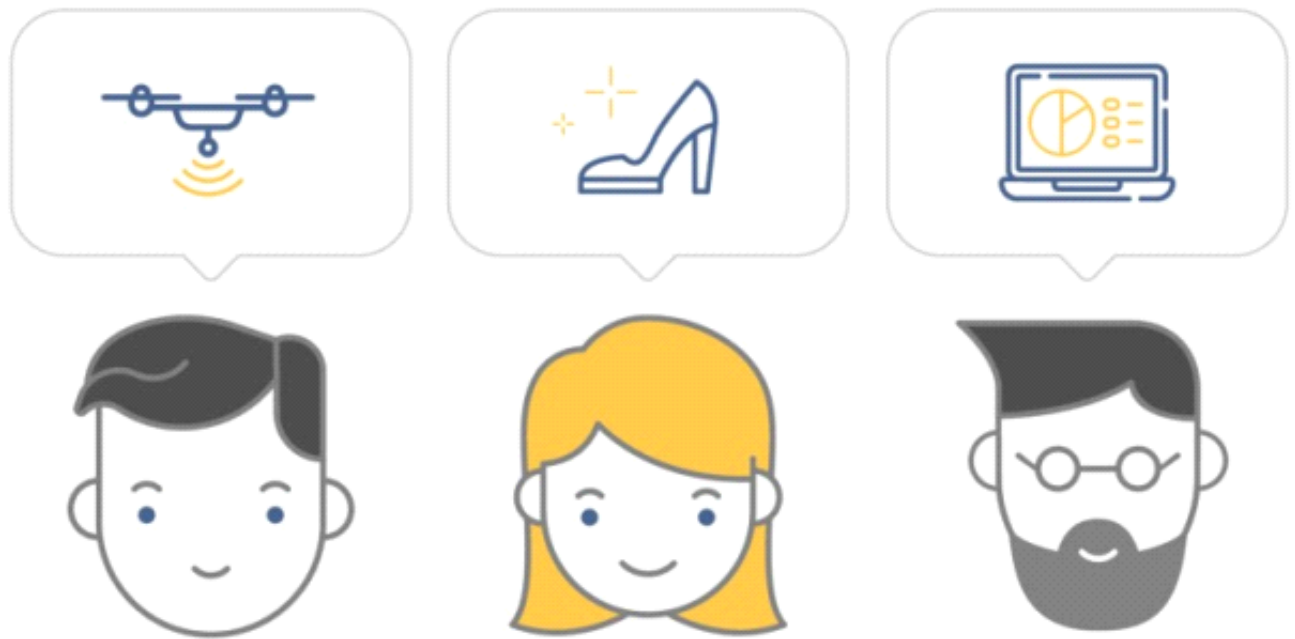
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Pricing

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## Recommendation engines

Recommendation engines proved to be of great use for the retailers as the tools for customers' behavior prediction. The retailers tend to use recommendation engines as one of the main leverages on the customers' opinion. Providing recommendations enables the retailers to increase sales and to dictate trends.



Recommendation engines manage to adjust depending on the choices made by the customers. Recommendation engines make a great deal of data filtering to get the insights. Usually, recommendation engines use either collaborative or content-based filtering. In this regard, the customer's past behavior or the series of the product characteristics are under consideration. Besides, various types of data such as demographic data, usefulness, preferences, needs, previous shopping experience, etc. go via the past data learning algorithm.

Then the collaborative and content filtering association links are built. The recommendation engines compute a similarity index in the customers' preferences and offer the goods or services accordingly. The up-sell and cross-sell recommendations depend on the detailed analysis of an online customer's profile.

# Market basket analysis

Market basket analysis may be regarded as a traditional tool of data analysis in the retail. The retailers have been making a profit out of it for years.

This process mainly depends on the organization of a considerable amount of data collected via customers' transactions. Future decisions and choices may be predicted on a large scale by this tool. Knowledge of the present items in the basket along with all likes, dislikes, and previews is beneficial for a retailer in the spheres of layout organization, prices making and content placement. The analysis is usually conducted via rule mining algorithm. Beforehand the data undertakes transformation from data frame format to simple transactions. A specially tailored function accepts the data, splits it according to some differentiating factors and deletes useless. This data is input. On its basis, the association links between the products are built. It becomes possible due to the association rule application.

The insight information largely contributes to the improvement of the development strategies and marketing techniques of the retailers. Also, the efficiency of the selling efforts reaches its peak.

# Warranty analytics

Warranty analytics entered the sphere of the retail as a tool of warranty claims monitoring, detection of fraudulent activity, reducing costs and increasing quality. This process involves data and text mining for further identification of claims patterns and problem areas. The data is transformed into actionable real-time plans, insight, and

recommendations via segmentation analysis.

The methods of detecting are quite complicated, as far as they deal with vague and intensive data flows. They concentrate on the detecting anomalies in the warranty claims. Powerful internet data platforms speed up the analysis process of a significant amount of warranty claims. This is an excellent chance for the retailers to turn warranty challenges into actionable intelligence.

## Price optimization

Having a right price both for the customer and the retailer is a significant advantage brought by the optimization mechanisms. The price formation process depends not only on the costs to produce an item but on the wallet of a typical customer and the competitors' offers. The tools for data analysis bring this issue to a new level of its approaching.

Price optimization tools include numerous online tricks as well as secret customers approach. The data gained from the multichannel sources define the flexibility of prices, taking into consideration the location, an individual buying attitude of a customer, seasoning and the competitors' pricing. The computation of the extremes in values along with frequency tables are the appropriate instruments to make the variable evaluation and perfect distributions for the predictors and the profit response.

The algorithm presupposes customers segmentation to define the response to changes in prices. Thus, the costs that meet corporates goals may be determined. Using the model of a real-time optimization the retailers have an opportunity to attract the customers, to retain the attention and to realize personal pricing schemes.

# Inventory management

Inventory, as it is, concerns stocking goods for their future use. Inventory management, in its turn, refers to stocking goods in order to use them in time of crisis. The retailers aim to provide a proper product at a right time, in a proper condition, at a proper place. In this regard, the stock and the supply chains are deeply analyzed.

Powerful machine learning algorithms and data analysis platforms detect patterns, correlations among the elements and supply chains. Via constantly adjusting and developing parameters and values the algorithm defines the optimal stock and inventory strategies. The analysts spot the patterns of high demand and develop strategies for emerging sales trends, optimize delivery and manage the stock implementing the data received.

## Location of new stores

Data science proves to be extremely efficient about the issue of the new store's location. Usually, to make such a decision a great deal of data analysis is to be done.

The algorithm is simple, though very efficient. The analysts explore the online customers' data, paying great attention to the demographic factor. The coincidences in ZIP code and location give a basis for understanding the potential of the market. Also, special settings concerning the location of other shops are taken into account. As well as that, the retailer's network analysis is performed. The algorithms find

the solution by connection all these points. The retailer easily adds this data to its platform to enrich the analysis opportunities for another sphere of its activity.

## Customer sentiment analysis

Customer sentiment analysis is not a brand-new tool in this industry. However, since the active implementation of data science, it has become less expensive and time-consuming. Nowadays, the use of focus groups and customers polls is no longer needed. Machine learning algorithms provide the basis for sentiment analysis.

The analysts can perform the brand-customer sentiment analysis by data received from social networks and online services feedbacks. Social media sources are readily available. That is why it is much easier to implement analytics on social platforms. Sentiment analytics uses language processing to track words bearing a positive or negative attitude of a customer. These feedbacks become a background for services improvement.

The analysts perform sentiment analysis on the basis of natural language processing, text analysis to extract defining positive, neutral or negative sentiments. The algorithms go through all the meaningful layers of speech. All the spotted sentiments belong to certain categories or buckets and degrees. The output is the sentiment rating in one of the categories mentioned above and the overall sentiment of the text.

## Merchandising

Merchandising has become an essential part of the retail business. This notion covers a vast majority of activities and strategies aimed at increase of sales and promotion of the product.

The implementation of the merchandising tricks helps to influence the customer's decision-making process via visual channels. Rotating merchandise helps to keep the assortment always fresh and renewed. Attractive packaging and branding retain customers' attention and enhance visual appeal. A great deal of data science analysis remains behind the scenes in this case.

The merchandising mechanisms go through the data picking up the insights and forming the priority sets for the customers, taking into account seasonality, relevancy and trends.

## Lifetime value prediction

In retail, customer lifetime value (CLV) is a total value of the customer's profit to the company over the entire customer-business relationship. Particular attention is paid to the revenues, as far as they are not so predictable as costs. By the direct purchases two significant customer methodologies of lifetime predictions are made: historical and predictive.

All the forecasts are made on the past data leading up to the most recent transactions. Thus the algorithms of a customer's lifespan within one brand are defined and analyzed. Usually, the CLV models collect, classify and clean the data concerning customers' preferences, expenses, recent purchases and behavior to structure them into the input. After processing this data we receive a linear presentation of the possible

value of the existing and possible customers. The algorithm also spots the interdependencies between the customer's characteristics and their choices.

The application of the statistical methodology helps to identify the customer's buying pattern up until he or she stops making purchases. Data science and machine learning assure the retailer's understanding of his customer, the improvement in services and definition of priorities.

## Fraud detection

The detection of fraud and fraud rings is a challenging activity of a reliable retailer. The main reason for fraud detection is a great financial loss caused. And this is only a tip of an iceberg. The conducted profound [National Retail Security Survey](#) goes deeply into details. The customer might suffer from fraud in returns and delivery, the abuse of rights, the credit risk and many other fraud cases that do nothing but ruin the retailer's reputation. Once being a victim of such situations may destroy a precious trust of the customer forever.

The only efficient way to protect your company's reputation is to be one step ahead of the fraudsters. Big data platforms provide continuous monitoring of the activity and ensure the detection of the fraudulent activity.

The algorithm developed for fraud detection should not only recognize fraud and flag it to be banned but to predict future fraudulent activities. That is why deep neural networks prove to be so efficient. The platforms apply the common dimensionality reduction techniques to identify



hidden patterns, to label activities and to cluster fraudulent transactions.

Using the data analysis mechanisms within fraud detection schemes brings benefits and somewhat improves the retailer's ability to protect the customer and the company as it is.

## Conclusions

Data science seeks its implementation in various sphere of human life. The companies implement different models of data analysis to enhance the customers' shopping experiences. In this regard, all the transactions, e-mails, and search inquiries, previous purchases, etc. are analyzed and processed to optimize the marketing moves and merchandising processes.

We attempted to highlight the top 10 data science use cases in the retail. These data science use cases prove the statement that data science and analysis have entered the sphere of the retail rapidly and still preserve its leading positions.

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