Assignment 6

EAS 504

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Base Questions:

- What are the principal uses of data sciences in this domain?
  A. Data Science is heavily used in various phases in a lifecycle of a retail product. In phases such as manufacturing, data science is being used in robotic automation, brand compliance. Another phase Warehousing uses data science warehouse planning, warehouse operations, inventory management. Data science is also used in price optimization, marketing. Retail is diverse and comprehensive

- How are data and computing related methods used in the organizational workflow?
  A. AI and deep learning algorithms to solve bin packing problem are being developed to help in manufacturing for robotic automation which learn and perform complex human tasks which were not possible before. The data science prediction function is used for better inventory management. Inventory management also consists of forecasting, demand planning, demand modeling, machine learning

- What data science related skills and technologies are commonly used in this sector?
  A. This domain of e-commerce retail uses various Machine learning, AI and deep learning techniques throughout the product lifecycle, STL decomposition for statistical forecasting, A/B testing for reminder emails. Technologies include data parallel processing tools such as Spark and native Map Reduce jobs.

- What are the primary opportunities for growth?
  A. As more and more people are taking their buying habits online, the e-commerce industry is growing at a fast pace. The more people spent their time on these websites the more data we have to work on. So, with this increasing data we can build better models and recommender systems in our existing system. Better algorithms and AI techniques will result in better accuracy which will in the end give us more users getting converted to buyers resulting in growth in revenue.

Case Studies:

Aspects of Data and ML applications at eBay as presented:

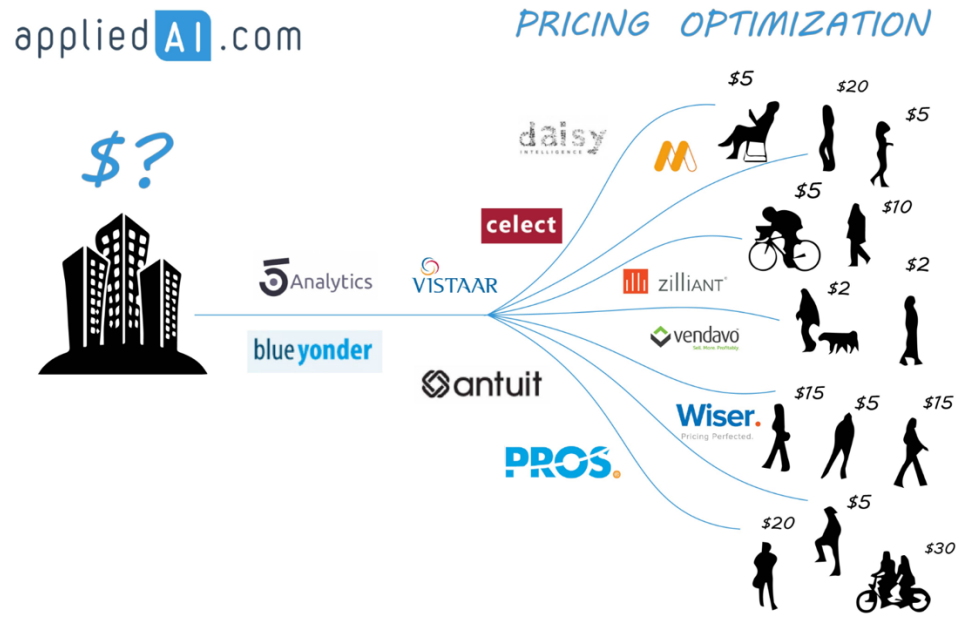
1. Inventory Management:
   Inventory management nowadays relies heavily on forecasting, demand planning, demand modelling and machine learning.
   - There are different stages of Forecasting:
     i. No forecasting: where you just run wild,
     ii. Naïve forecasting: Here we assume whatever users purchased last month, he/she will purchase the same product again. For Example, a mobile phone vs toilet paper.
     iii. Statistical forecasting: Fits a forecast curve through historical or weekly demand patterns. It incorporates trend data, seasonality and modeling averages.

- Demand Planning:
  - Leverages more granular and downstream data to get a cleaner demand signal and reduces velocity and bullwhip effect.
  - Includes techniques that are usually associated with short term demand sensing to dramatically increase long term accuracy.

- Machine Learning:
  - Takes advantage of extended and even big data to further increase accuracy.
  - It relies on powerful models to consider demand drivers such as promotional details, new product introductions, social media, etc.

Inventory management is a very complex topic, it's very deep. Companies such as Oracle, Amazon, eBay, IBM have big presence this space.

2. Price Optimization:



- Dynamic pricing allows large and small companies improve their margins quickly. Price here is flexible based on demand, supply, competition price, subsidiary product prices. Prices may even change from customer to customer based on their purchase habits.
- Dynamic pricing enables suppliers to be more flexible and adjusts to prices to be more personalized.
- There are various benefits of price optimization such as more precise SKU level prices, faster response to demand fluctuations
- Line search algorithm. Linear programming equation, constraint optimization is used to put objective function to maximize your revenue where we find optimal price to sell a product to a customer and drive the sales.