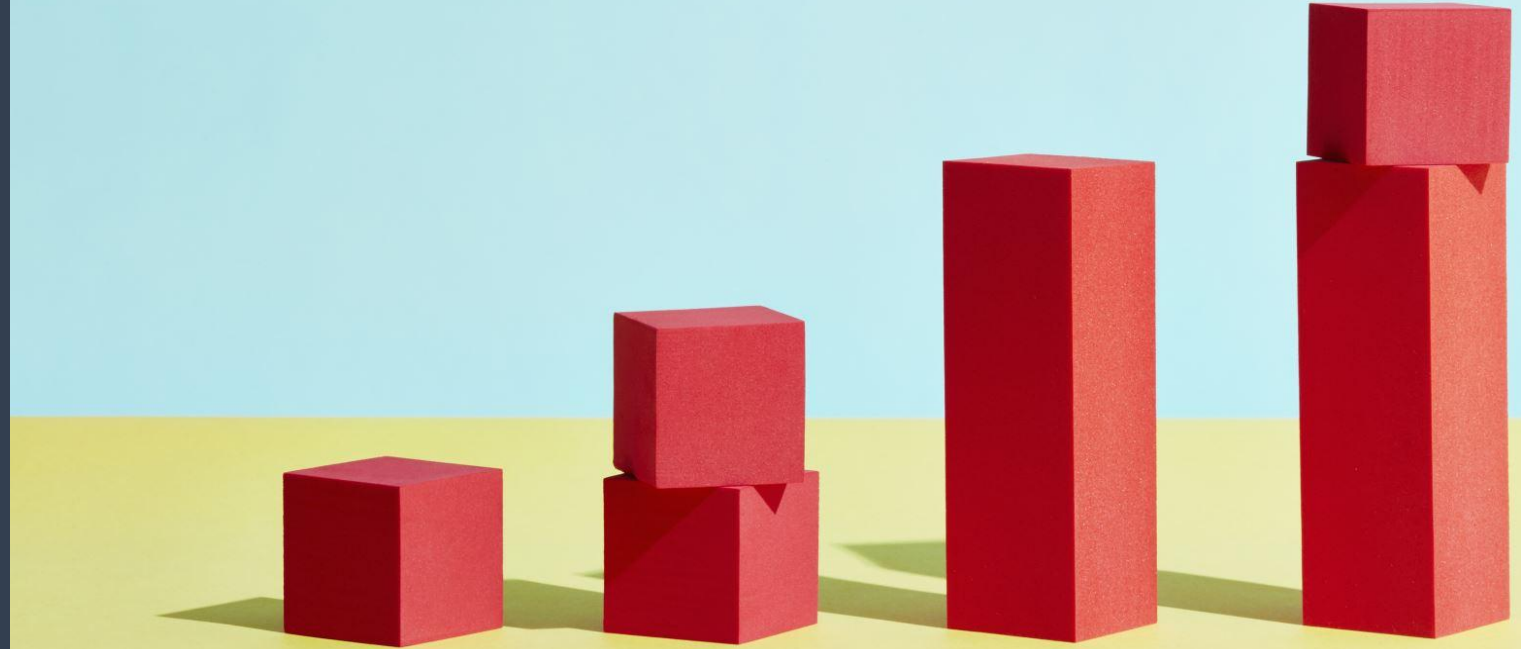


Airlines Yield Management system



Airlines Yield Management System

Yield Management System is the process through which an Airlines company tries to get the most revenue out of each ticket booking; in a highly competitive industry like Airlines it is imperative to know that sweet spot where company can get most with least probability of losing out on the customer; The objective is to build an AI system which leverages different kind of data and machine learning models to come up with that price which is attractive to customer and profitable to airline

Can you suggest a solution (**Data, Analytics & ML**) which can help Airlines to build such an AI Engine? Please consider below parameters to come up with your solution

- What kind of data dimension(features) would you like to consider? One example is Macro Economic Indicators please come up with more such dimensions.
 - Macro economic indicators(inflation, employment rate, interest rate, crude oil price)
 - Peer analysis(new offers from competition, new players, tie-ups, technology change)
 - Events(Holidays, weather)
 - Customer(demographic, flying patterns, payment ways)
- What kind of relationships you can visualize amongst various features from Airline industry point of view?
- What would be the machine learning models you would like to evaluate and the reason?
- What is the role of optimization in this problem solving?

Solution Suggested

A **Yield management system** is a real-time decision making system that maximizes earnings by controlling inventory and pricing according to consumer behavior prediction on micro-market levels.

For every flight, the optimal seat allocation and overbooking limits for each fare class needs to be determined such that revenue is maximized.

Dynamic pricing is the one of solutions we suggest which can help to maximize the profit, can be implemented through **machine learning(ML) algorithms and mathematical optimization techniques**. ML system takes the data, builds a model around the data and produces output.

Dynamic pricing or Price optimization is the concept of offering tickets at different price which varies according to the customer demand



What kind of data dimension(features) would be considered?

Below are the list of features would be considered to implement this solution:

- Macro economic indicators(inflation, employment rate, interest rate, crude oil price)
- Peer analysis(new offers from competition, new players, tie-ups, technology change)
- Events(Holidays, weather)
- Customer(demographic, flying patterns, payment ways)

There are other features which can also be considered:

- Cabin class passengers data
- Cabin class supplied capacity data
- Distance of flight(Trip length)
- Year–month data and revenue data
- A booking history with millions of daily departures
- Frequency of sale
- Customer behavior(what other flight they are looking for, How often they check prices, which links they clicked)
- Passengers segment (like Leisure travelers (book in advance, choose cheaper seat), business travelers(book at last moment, fare doesn't matter)
- Event such as – cost of fuel increase, pandemic , lockdown etc
- Operational data
- If a flight carrier launched a new flight then flight price would be cheaper for competitor carriers.
- Revenue
- Discounts and offers
- Seat distribution of fare Classes

What kind of relationships can be visualised amongst various features?

EDA(Exploratory data analysis) is an approach to analyzing data sets to summarize their main characteristics, often using statistical graphics and other data visualization methods

Below are the list of we would visualize amongst various feature:

- Profit Vs Ticket price
- Ticket price Vs day of departure (like 6 month ago, 1 month ago, 1 week ago, 1 day ago etc)
- Discount Vs day of departure
- Peer analysis(new offers from competition, new players, tie-ups, technology change)
- Events(Holidays, weather)
- Customer(demographic, flying patterns, payment ways)
- Best day to fly based on ticket fare
- Cabin class Vs Revenue
- Route-wise Analysis
- Passenger segment Vs revenue
- Demand Vs Supply
- % of seat distribution of fare classes
- Revenue Vs Fare classes(Economic, business class, First class etc)

Machine learning models would like to evaluate and the reason?

To implement **Dynamic pricing** or **Price optimization** to maximize the profit we can consider below AI, machine learning approaches:

1. Since this is Regression problem so we can use **Multi Linear Regression ,Decision Tree Regressor or ANN** algorithms to get optimized price for Flight ticket.
2. We can also use **Time series** for forecasting of future demand.
3. We can also build a new Yield management system(Dynamic pricing) based on **Reinforcement learning**.
Reinforcement learning (RL) is an area of machine learning concerned with how agents take actions to optimize a given long-term reward by interacting with the environment they are placed in.

What is the role of optimization in this problem solving?

Airlines can optimize total revenue by taking dynamic pricing a step further. Dynamic pricing needs to be fast-acting and look at more than just the traditional factors.

Discounts are necessary sometimes, but it's important to ensure they don't price too low, or too high. With dynamic pricing, Airlines can lower prices to meet their revenue goals by incorporating market trends, internal stock levels, and competitor data to find the most ideal price.

We can consider **LP (Linear programming)** and **Stochastic LP** to optimizing the pricing of air Tickets.

Linear programming is a simple technique where we depict complex relationships through linear functions and then find the optimum points.

Thank You

