

ISYE 6501 COURSE PROJECT - DISNEY GUEST EXPERIENCE

Article:

How analytics enhance the guest experience at Walt Disney World

<https://www.informs.org/Impact/O.R.-Analytics-Success-Stories/Industry-Profiles/Disney>

Summary

Disney World always means the amazing and joyful vacations with family. Guests are provided the best and unforgettable life time experience inside Disney resorts. The article unveils some of the analytics plannings and initiatives to ensure the smooth operations and maximize the guest experience that Disney has been putting in the back scene.

Improve Guest Experience through Forecasting

Forecasting plays really important role in the operations planning of Disney. The article mentions several areas that Disney leverages using forecasting models:

1. Forecast to plan labor effectively
2. Forecast of the costumes demand
3. Forecasting of the waiting time

Making Smarter Decisions

Driven by the forecast models, also coupled with data mining and optimization models, Disney also put analytical efforts to customize offerings and experiences that better match guests' expectation. Initiatives that analytics drives decisions:

1. Customize marketing offerings with better understanding different types of guests
2. Streamline back-of-house operations like laundry, hotel front desks and warehousing facilities
3. Optimization in table-service restaurant operations to determine the right mix of tables to meet guest demand

Solution

Although there are lots of different analytical initiatives mentioned in the article, the major problem is straightforward: how to maximize the resources to meet the demand of guests and provide the best guest experience through forecasting and optimization.

Data Assumption:

Before getting into the model building, let us make the data assumption first. Since Disney is a large company with lots of talents and advanced systems, I think we can safely assume there will be detailed data about their operations tractions captured as well as detailed customer profile data that can be legally used.

Model Building:

1. Forecast the labor demand at different spots in the resort in short term

Given: historical time series data of guest count, each guest arrival time, transaction count at major spots in the resort, fast pass booking data and fast pass guest arrival times

Use: ARIMA time series model, probability-based model

Result: forecast the trend and total of guest count and transaction count intraday; forecast of the arrival rate of regular guests and fast pass guests

The first step is to correctly forecast the guest demand required at different areas in the resort. By given the guest arrival times and guest count, it is possible to use either time series model or probability-based model to forecast the guest count, transaction count or the transaction rate for intraday. It might be possible to use factor-based regression model but it would be too complicated because there will be too many factors behind the scene. Ideally, it should be expected to find a probability-based model at different areas in the park.

The data should be collected and updated real time. Directly the forecast results can be used right away to better allocate the labor forces as well as alert the operations team to plan the scheduling proactively. Eventually, from analytics perspective, the forecast result should be used as input to the models we are going to build in the next steps.

In the real world, the intraday guest arrival rate should be dynamic based on different factors. In order to provide the most accurate forecast, we should generate the forecast for every half hour or divide the operations hours into several slots and use different parameters in the forest model.

2. Queuing model using the forecast result to simulate waiting times

Given: Guest arrival rate and time periods from the forecast model (regular and fast pass) in different time slots from 1st model, service time in different activities, weather data about temperatures and weather conditions, waiting time target (if apply in certain areas)

Use: queuing model using Arena simulation

Result: output of the expected waiting time in different areas or activities within different time slots, find the best labor count to achieve the waiting time target

The simulation model should be coupled with the forecast model to provide the best estimation of the waiting time. In addition, the simulation model should also help the resort to find the min resources required to meet the demand or to achieve the goal of the service level.

The model should be run depending on the forecast model refresh. It should be operated dynamically to provide the real time waiting time simulation. Especially to leverage impact of the weather given by the weather related data. In the simulation model, we can build a tree based model given different conditions to simulate the waiting times.

3. Optimization of the labor planning given the forecast model and queuing model

Given: results of all areas and times from forecast model, results of all areas and times from simulation model, the cost rate of labor, the travel time and cost of reassign labor to different areas

Use: Optimization model

Result: Optimized solution of the labor operations planning

The constraints should be to meet the guest demand as well as to achieve the operations targets. The Objective should be how to minimize the total count or cost of the labor needed. In this way, we can find the best solution to optimize the operations planning. To further improve the optimization model, we can build the model conservatively by adding extra guest count just in case. Another option is to build a scenario based model by designing different operations scenarios. The optimization result should not only provide the optimal solution for operations planning day by day but also provide the estimated labor demand of the resort.

In longer term, without listing out the model, we should use the optimization model by day to develop the long term scheduling and planning to integrated with HR team for hiring process.

4. Customize market offerings based on customer profiles to improve guest experience

Given: The related customer data that can be legally used: occupation, how many people in the household, income, location (not correlated with races); the guest arrival rate of each areas from forecast model, waiting times from queuing model, historical data of market offerings

Use: KNN classification, logistics regression

Result: the events or activities guests are most likely to attend in the resort, the best marketing packages that should be offered to guests

The most straight forward method seems to be the KNN, however, there is chance that some of the guests have some major factors in common so the system will always recommend the same offerings. It will be helpful to build the logistics model to provide the probability of different guest group will choose. For the response data, we can leverage both the data in the forecast model and the historical offerings to better understand which areas attract different types of customers.

At the end, by using multiple kinds of modeling under the assumption that the comprehensive data will be available, I come up with the above modeling solution to improve the resort operations planning as well as provide the customized target marking strategy in order to improve the guest experience in the Disney resort.