WALT DISNEY WORLD CASE STUDY

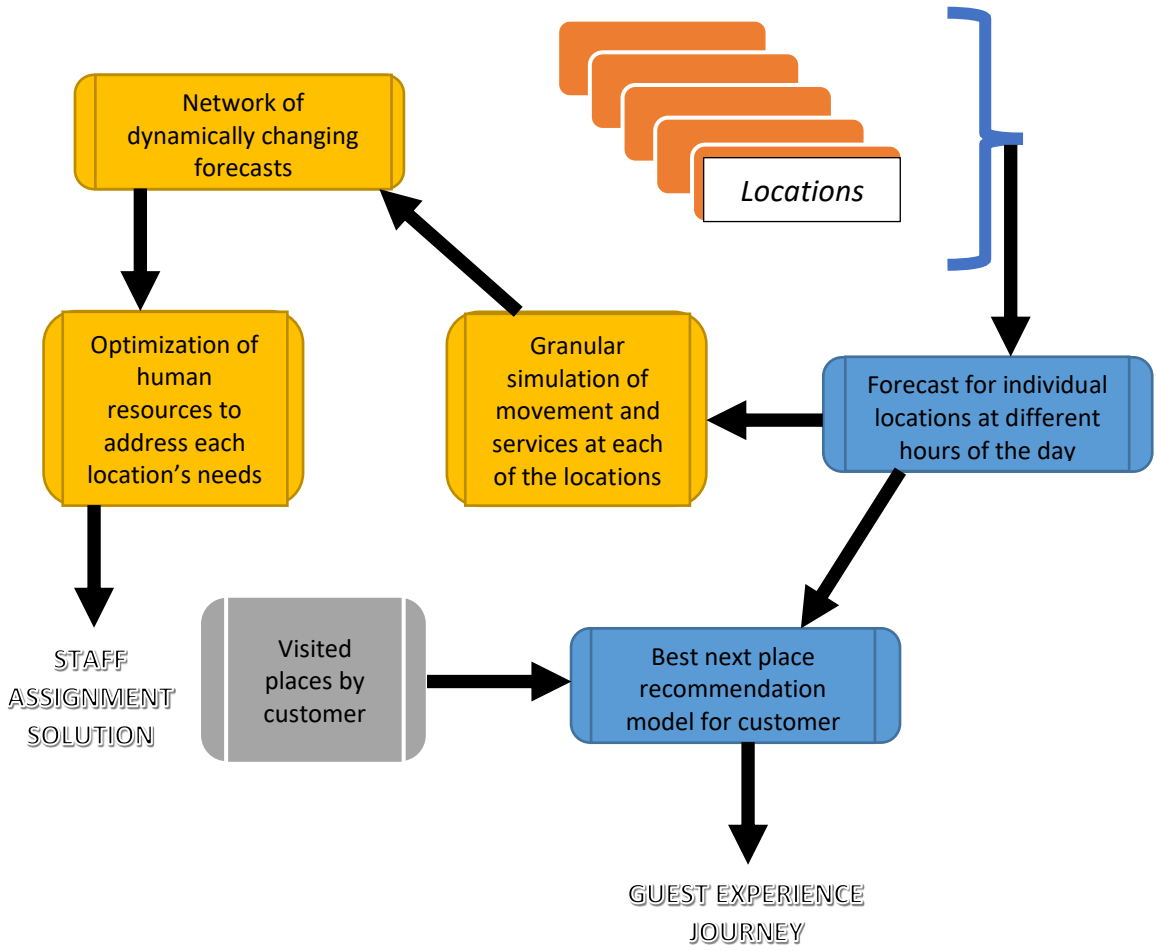
ANALYTICS STORY SOURCE -
https://www.informs.org/Impact/O.R.-Analytics-Success-Stories/Industry-Profiles/Disney

Note for every step documented –
1 – Given data in RED.
2 – Technique in BLUE.
3 – Output of technique in PURPLE.

The Brief of The Problem –

The Walt Disney Theme Park has a lot of guests every single day and there are so many different entertainment areas, shops, living areas, restaurants, games, and relaxation areas for people to enjoy. Being one of the happiest places in the world to a lot of Disney lovers comes with the responsibility of meeting the expectations of a memorable guest experience. Analytics plays a huge part in determining the crowds at each location at given times, and staff needed to handle the guests, and guiding guests to places that help them maintain the mood the of the place in the most fulfilling way possible. This is a simplified but holistic view of how Walt Disney World might benefit from an analytical system based on the needs and descriptions they've given.

ANALYTICS SYSTEM WORKFLOW –



In summary, the system –

1. Evaluates individual forecasts for each discrete location
2. Simulates movement and services in each of these locations
3. Determines staff required in each of these locations
4. Optimizes the manner in which the staff is distributed across all these locations
5. Stores the individual forecasts for each location
6. For each location at a specific time, and with specific crowd forecast, calculates the next destination to visit for the guest.

Now let us decide what data we need. In this case, we need three datasets with information pertaining with each location for the first two, and information pertaining to each customer on the third dataset.

DATASET 1 AXIS 1 – All locations

1. Walt Disney Hotel
2. Cycling Park
3. Tinkerbell Lights Show
4. Disney Castle

And so on…

DATASET 1 AXIS 2 – All predictors

1. Crowd
2. Staff availability
3. Weather
4. Customer type
5. Materials / Product availability
6. Reviews for the place
7. Most Likely Next Location (Derived)

DATASET 1 AXIS 3 – Time-Series

In hours, for last 5 years.

DATASET 2 COLUMNS have the same names as DATASET AXIS 1 from the 3-D dataset.

DATASET 2 ROWS –

1. Price
2. Maintenance schedule (times at which to close for maintenance)
3. Standalone events impact (factor by which crowd increases/decreases based on unique events that affect – such as political events, national holidays, terror alerts, lockdown, etc.)

DATASET 3 AXIS 1 – current location and next location

DATASET 3 AXIS 2 – Instances of everyone's movement

DATASET 3 AXIS 3 – Time in hours

1. For the forecasting model –

Given: For each location, given the time series data for the predictors, and the data from the second dataset.

Do:

a) create a multiplicative exponential smoothing model for the predictors, and identify
- yearly, weekly, and daily cycle for crowd
- yearly cycle for the weather
- yearly and daily cycle for staff availability
- yearly and daily cycle for customer type
- daily and monthly cycle for product availability

b) Identify trends in this data.

c) Incorporate a moving average of past value weightage window and calculate probable value for each for the current hour.

d) Use regression to determine how weather affects crowd and then give an updated approximation of the predicted crowd.

To: determine the crowd at a specific location at a specific near future hour.

2. For the simulation model –

Given: The type of place with domain expertise of what occurs at this place, and crowd forecasts from step 1.

Do:

Simulate the arrivals and services using Poisson and exponential distributions. Take the arrival rate as the crowd calculated for the place divided by 60, and that would be the customers/minute rate. Service rate would be as observed usually.

Setting a standard of how long a customer can be entertained and made to wait, determine the minimum number of service counters needed to service the customers.

To: Determine the staff needed for those service counters.

3. For the optimization model –

Given: The product availability at each location, the crowd at each location, and the staff needed at each location.

Do: Construct a network optimization model, where the excess of one place is transferred to the deficit of another place, and the movement is guided by capacity needs, and product availability versus crowd present. As in, a Boolean switch exists where if the product availability does not meet the crowd's needs, the need for transfer of further staff there is removed, since that won't make a difference.

To: Determine the most efficient way in which the human resources could be utilized.

4. For the user-map model –

Given: The current and next place data, the reviews for the place, the forecasted crowd, and the past visited places.

Do: Bayesian analysis of the best next place given the current and visited places, forecasted crowd, and give a score to each next place for the current place at a given time called most likely next location.

To: Ensure the best recommendations to customers as to where to go next so they have a holistic, seamless, and well-balanced experience.