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Business Forecast in Tourism Using Predictive Analysis

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Abstract: *The hotel and hospitality sector caters to millions of travellers every day, and each one of them checks in with their own set of expectations. Meeting those expectations is the key to getting people to return, and increasingly hotel and leisure operators are turning to advanced analytics solutions for clues about how to keep their customers happy. Predictive analysis is a field of data mining that is used to study the data in the past and make predictions about the future. This paper illustrates how predictive analysis can be used for increasing the sales and reducing the expenses based on advanced algorithms based on past data patterns. This will also help business to focus their marketing in the right way to increase occupancy and reduce expenses by internal optimization. Data visualization is done using Power Bi and Tableau to predict the results in terms of occupancy during the various seasons of the year, kind of guests their menu and other details.*

Keywords: *Data Analytics, Data Visualization, Predictive analysis, Business Intelligence, Power BI, Power Query, Tableau.*

1. INTRODUCTION

Predictive analysis is a statistical or data mining solution. It consists of techniques or algorithms that is used both on structured and unstructured data to determine the outcomes. It comprises of a wide variety of statistical techniques from data mining, modeling and machine learning. Predictive analysis is used to analyze historical data and make predictions regarding the future. These predictions help in making important business decisions based on the predicted results.

2. BUSINESS SCENARIO

Although the marketing departments of hotels would loathe to admit it, not all guests are equal in the eyes of hotel and leisure operators. Some will simply check in and check out with a minimum of fuss. Others will spend hundreds or thousands of dollars on fine dining, entertainments, sports activities and spa treatments. Identifying those customers with a higher overall lifetime value to a particular business is hugely important in today's market, but a customer's lifetime value might not be empirically obvious from observing their behaviour during one visit. Analytics has applications in all of these areas and although the hotel and hospitality sector has lagged behind others such as retail and manufacturing in adopting an analytics-first philosophy that could be starting to change.

3. BUSINESS REQUIREMENT

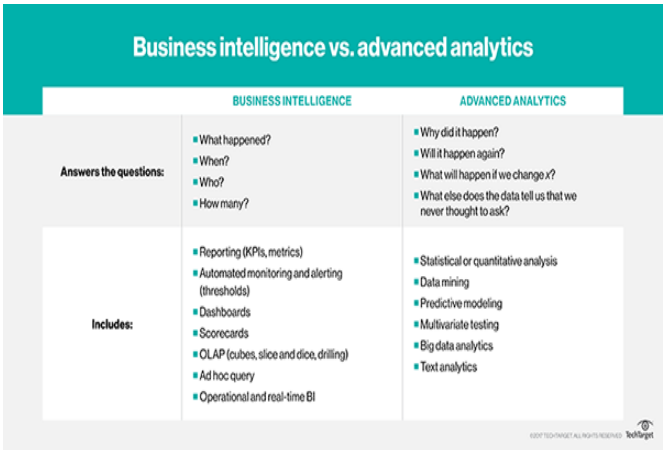
Would it be possible to ensure that each room attracts the optimal price – taking into account troughs and peaks in demand throughout the year as well as other factors, such as weather and local events, which can influence the number (and type) of guests checking in? The key issue faced by the resorts and hotels is less occupancy level. This is where business intelligence and data analytics, mining of the immense business data left behind, finding trends and patterns would help our client. The challenges are migration of huge amount of un-organized critical and sensitive data in an organized manner and mining the data.

4. BUSINESS INTELLIGENCE

Business intelligence (BI) is a technology-driven process for analyzing data and presenting actionable information to help executives, managers and other corporate end users make informed business decisions. Business Intelligence (BI) is used to describe the provisioning of decision support in businesses .BI is good for slicing and dicing of data to answer questions such as:

- What is happening?
- What happened?
- Why it happened?

Figure 1. Given below is a comparison of Business Intelligence with advanced analytics [1]

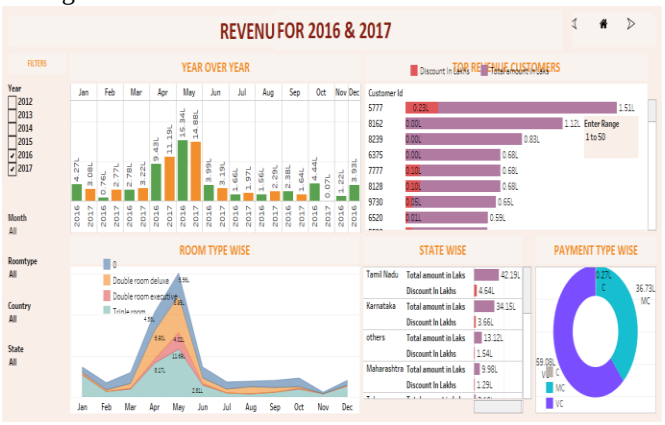


BI encompasses a wide variety of tools, applications and methodologies that enable organizations to collect data from internal systems and external sources; prepare it for analysis; develop and run queries against that data; and create reports, dashboards and data visualizations to make the analytical results available to corporate decision-makers, as well as operational workers. The term Analytics is derived from the science of data analysis that is more commonly associated with BI. Analytics is an impressive way to depict data into various forms

- graphs, charts and maps
- and have a better and a wider picture of the analysis

However BI provides dashboards or static reports which are inflexible. Therefore we need to have tools that can create flexible reports and interactive dashboards. Power Bi is one such tool. There are other tools such as Tableau, SSRS, and IBM Watson etc... Power BI is one of the simplest tools.

Given below is a sample chart which uses Business Intelligence.



5. DATA VISUALIZATION

A. *Power BI*

Power BI is a cloud-based business analytics service that gives you a single view of your most critical business data. Power BI is an excellent way to portray the structured data in a graphical form. Structured data can be analyzed and studied easily by the user.

B. *Features of Power Bi*

Figure 2. The following are some of the important features of Power Bi:

- Power Query
- Power View
- Line graphs, bar charts
- Stacked columns for analysis purposes.
- A scatter chart with the video play of timeline is used to show and compare the trends of various countries together in the same graph.
- Various graphical representations have been used to demonstrate analysis, prediction and solution.

C. *Tableau*

Tableau is a data visualization tool that can allow you to visualize almost any data. It has exceptional analytics demand more than a pretty dashboard. It can quickly build powerful calculations from existing data, drag and drop reference lines and forecasts, and review statistical summaries.

D. *Features Of Tableau*

- Data visualization with **Tableau** makes insights come alive with impact and communicates complex ideas in a simple way.
- Expressive visualization enables you to get beyond static charts to create multi-faceted views of **data** and explore every dimension.
- **Tableau** connects to many different data sources and can visualize larger data sets than **Power BI** can.
- Tableau can connect to nearly any data repository, ranging from MS Excel to Hadoop clusters.
- The drag-and-drop capabilities of the solution, paired with its extensive data source connections, make Tableau a front-runner in the realm of data visualizations.
- Tableau has added in data federation that scales across their platform, enhanced mobility support including enhancements for responsive mobile app design and development, and streamlined workflows for advanced analytics.

6. BUSINESS FORECAST USING PREDICTIVE ANALYSIS

Business forecast can be made in terms of the various parameters affecting the business. For example the occupancy of the rooms during the various seasons of the year can be predicted using data analytics. Different parameters can be analyzed such as the category of the guests in a particular time of the year, the food habits of the guest so that menu can be planned accordingly. Sightseeing can be planned on the basis of the resident's background. For example people from cities might prefer visiting nature friendly places away from the busy city environment. This information can be taken into account and predictions can be made based on the parameters that affect the scenario. The analysis can be done on the basis of the specific factors chosen for prediction. The same can be analyzed using any one of the data analytics tools such as R Programming or Python or Alteryx and so on.

A. Example –Sales Forecast

Let us take an example of forecasting the sales of any production company. The need for the product might sometimes be seasonal such as clothes which has a huge need for winter clothes during winter and summer clothes during summer. Hence the manufacture of summer wear can be slowed down during winter and vice versa for winter wear.

B. Example –Consumption Forecast

Let us take another example of forecasting being done in the case of products that are consumed by people living in various parts of the world. The items consumed are dependent on the various food habits of the people and the culture of the people in that country. It is also seasonal since during winter people prefer to have hot items like coffee tea, fried items and during summer people prefer to have cold items like ice-cream, juice etc. The exact results can be visualized by considering all the parameters affecting the scenario.

C. Example-Health Forecast

Another very important forecast can be made in terms of the general health of the public in terms of various influencing factors such as food, daily habits, seasons etc.. For example during rainy season people suffer from diseases such as cold, flu, viral fever etc. and during summer diseases such as chicken pox, malaria, measles etc. Other non-seasonal diseases like high blood pressure, diabetes, cholesterol, cancer etc. which are caused due to the daily habits and food that we consume. The actual data can be collected and predictive analysis can be done in order to forecast the future. We can predict any epidemics that is likely to happen with the data available.

7. TOURISM BUSINESS FORECAST HIGHLIGHTS

Business data analytics helped to realize the following goals

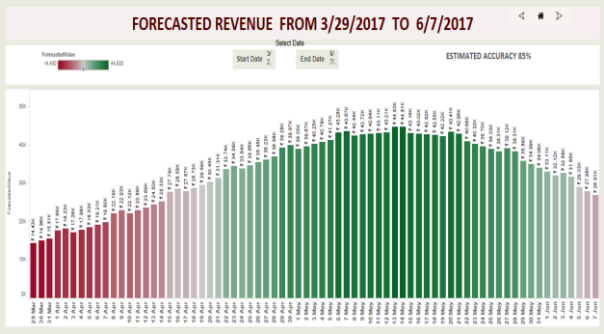
- Accurate insights through dashboards to improve business operations,
- Plan better marketing strategies
- Yield Management to stabilize occupancy rates and yield.
- It allows the restaurant department to predict which menu items are likely to be ordered, based for example on the local weather.
- It allows the reservation department to predict the optimal rate for a room.
- It enables the sales and marketing team to create and send tailored messages across different networks.
- Predictive Analytics: To determine "what next". "This allows hoteliers to make adjustments as they go forward based on insights gathered through econometrics; guests' purchasing and stay behaviors; activity on our delivery channels, such as our brand.com websites and mobile apps; and so forth.

 Customer Segmentation dashboard to create a unique selling proposition which leads to increase in revenue and also aids in upselling and cross selling of facilities resulting in better revenue & profits.

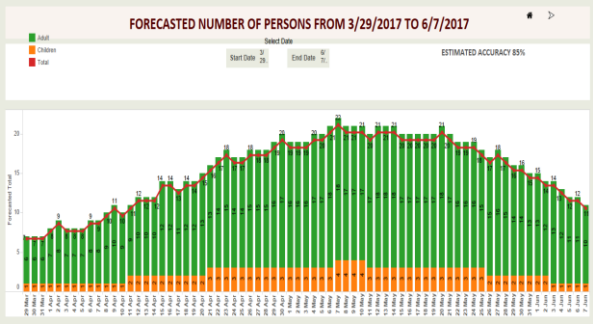
The existing data is analyzed and after predictive analysis data visualization is applied by using the tool Tableau and Power BI. Given below are some of the sample reports that have been generated in terms of forecast of the revenue, forecast of the occupancy of rooms, forecast of the number of people and forecast of the rooms needed.

A. Some Sample Reports Using Data Visualization

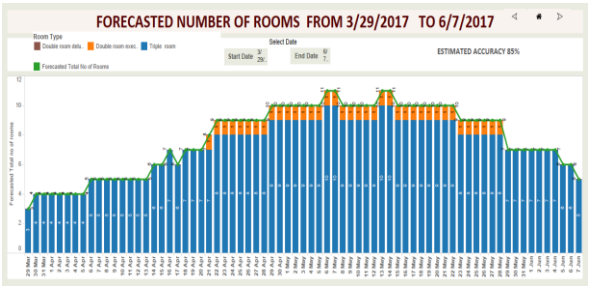
1) Forecasted Revenue



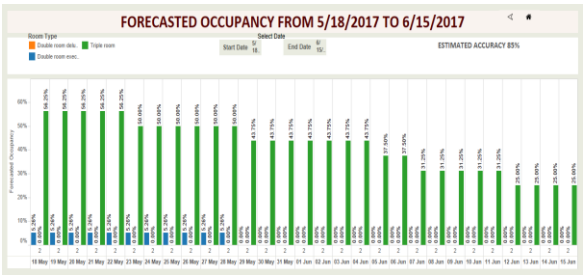
2) Forecasted Number Of People



3) Forecasted Number Of Rooms



4) Forecasted Occupancy



8. RESULTS

The results of the forecast :

- Sift through massive amounts of information- from customer feedback to room price,
- Length of stay and more-to understand why customers choose their hotels and why they choose to return
- Cut down their energy costs without sacrificing guest comforts
- Evaluate an itenarys's likelihood of success, For example, the concierge can now know which local tours to recommend that fit a guest's preference based on his past behavior.
- Analyze if it is a leisure traveler or business traveler
- Categorize the traveler based on the state or country so that a decision can be made on the areas of interest with respect to site visit, food and entertainments.

9. CONCLUSION

Big Data isn't just a future trend in the hotel world — it's already helping hoteliers create a better customer experience and a more profitable business. This paper presents the importance of data analytics in tourism domain. The analytics

along with the visualization helps in making better business decisions.

Helps marketing to focus on right location /Right set of people.

: Workout discounts in advance based on occupancy

: Customize menus, mood, theme etc. based on age and origin of the guests where in attaining more customer satisfaction and repeated visits

: Categorise business traveller /Leisure traveller and serve their customized needs.

Predictions help in forecasting the future and thereby taking necessary actions to improve the business with respect to different parameters as discussed.

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