Introduction

1. Introduction of the Project

Watershed Properties is a residential property management company. We manage several thousand properties in more than 60 different neighborhoods around the United States. We are very proud of our relationship with our property owners and our tenants, which allows us to keep our overall property occupancy rates at a very attractive 97.3%.

Like most traditional property managers, Watershed has thus far exclusively managed long-term leases that typically require tenants to live in a property for a year or more, and pay monthly rent. However, the real estate business has begun extending into a different market: short-term rentals. Short-term tenants, or "guests," pay rent by the night rather than by the month, and are located and communicated with through increasingly popular websites like Airbnb. We would like to know whether Watershed should expand into this short-term rental market.

Watershed currently has a time-sensitive opportunity to explore the short-term rental market with one of its top property owners, who has expressed interest in working with Watershed to convert some of its long-term rental properties to short-term rental properties. We would like you to (1) calculate how much it would cost to convert and maintain each of this client's properties as a short-term rental, and (2) determine the nightly rental price that would maximize the profits from each of these properties, if they were converted to short-term rentals. We would then like you to use this information to, (3) calculate which properties would have increased profits as short-term rentals, and (4) determine how profitable, overall, it would be if Watershed converted some of this client's properties into short-term rentals. You will also (5) need to determine how much cash Watershed would need in order to realize any potential profits from converting the properties. We would like you to synthesize this information into a succinct business recommendation: Should Watershed enter the short-term rental market using some of this client's property portfolio, or not? If so, which properties should be converted first? You will be presenting your recommendation to Watershed executives in a 5-minute long business presentation in the last week of this project.

2. Steps of the Project

2.1. Outline

1. Elicitation Interviews

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2.2 Details

2.2.1.Elicitation Interviews

Background and rationale: Understanding your stakeholders' needs and constraints is critical to the success of your project, and is one of the main places data analysis projects fail. Knowing how to arrive at this understanding is also a skill for which employers are willing to pay increased salaries. If employers don't feel confident in their analyst's people-facing skills and ability to communicate, they will hire someone with more traditional business experience to communicate with stakeholders instead of the analyst, which will take away funds that could have otherwise been spent on the analyst. This peer review will impart the importance of good stakeholder communication for successful data analysts.

Instructions: If you were undertaking this analysis project in real life, list (by role) three types of individuals, inside or outside the Watershed company, whom you would consider as stakeholders. For each, list at least one question you would ask that stakeholder during elicitation.

For example, "Watershed project manager" might be one such stakeholder. A question you might ask this stakeholder is: "Who will be making the final decision about whether or not Watershed will enter the short-term rental market?"

2.2.2.Data Plan

2.2.3.Retrieve the Data (Jupyter Notebook)

Watershed's intern compiled several sources of information that will be useful for your project. These three types of information are contained in the capstone database:

1. The current monthly rent Watershed charges for all of their client's 244 properties, as well as the property type and geographic location of those properties.
2. Some general information about examples of short-term rental properties. This information can be used to get a sense of what kind of nightly rental price Watershed's client's properties could be listed for, if they were converted to short-term rentals.
3. Records about when those short-term rental properties were rented out, so that you can calculate their occupancy rates.

Your job is to determine how the database is organized so that you can retrieve all of the available information about Watershed's client's 244 properties, as well as the corresponding short-term rental information for comparable properties in the same location and of the same type.

1. Start by determining what tables the database contains, and what fields are included in each table. Do this by accessing the Jupyter notebook in this lesson, and running the appropriate queries there.
2. Then, we recommend that you make at least a rough relational schema of how the database is organized, so that you know what fields you can use to join tables.
3. Next, make a list of the columns of data you want to retrieve in your final output.
4. Finally, write your queries to retrieve the desired data from the database.

2.2.4.Visualize the Data to Make Sure Knowing What They Are (Tableau)

Before you start any kind of analytical or statistical modeling, it's important to look at your data to make sure you understand what they represent, to look for outliers, and to examine whether they contain any obvious effects or relationships you should take into account when designing your models. If your data are already in table form (as they will be after you have extracted them from the MySQL database), the fastest way to do this is by using Tableau.

2.2.5.Excel: Modelling; Normalization; (Optimization); (Alternative to Solver)

Modelling

Your first task will be to forecast what the best short-term rents for Watershed's 244 properties would be. Note that the "example" short-term rental properties from the database - the same type in the same location (unique ID for each city, state and zip code) do not have optimal rents – but they are useful in showing an overall relationship between rent levels and occupancy rates.

Normalization

So we need to modify the x-axis data to make its association with occupancy rates apparent and to allow us to create a model that is more predictive. This process, which is often necessary in data-analysis, is called “normalization.”

Normalization can take many forms. In our case, we are going to consider each comparable property nightly rent in terms of how it compares to the rents of other properties of the same type in the same location. The data we have to help us do that are the 10th percentile (low) and 90th percentile (high) rents for each of the 244 combinations of comparable property type and location.

Rents differ in two main ways between property types and locations. First, the 50th percentile may be higher or lower with the same dispersion – so an inexpensive location might have a dispersion from $50 at the 10th percentile to $150 at the 90th, with a 50th percentile at $100, and an expensive location might have the same dispersion over $150 to $250, with a 50th percentile rent of $200. Second, the dispersion of rents may vary. So two locations may both have a 50th percentile-rent of $125 for a one-bedroom house, but one market may have prices from $75 to $175 while another location has rents from $40 to $210.

We also assume that rents are distributed uniformly between the 10th and 90th percentiles, and that we can build a linear model over the 10th to 90th percentile range. Note that all 244 sample comparable properties fortunately have rents that fall within the 10th to 90th range for that type and location. Later, when trying to find the optimum (revenue-maximizing) rent for a particular Watershed property type and location, we will also assume that no rent can be set lower than 10th percentile or higher than 90th

(Optimization)

You will now use your new model's parameters (the line's slope and y-intercept), along with given constraints, to predict the optimal nightly rent (in dollars) that should be charged for the Watershed client's properties. The optimal rent is of course the rent level that would maximize total annual revenues, (the product of rent and occupancy rate multiplied by 365).

You'll use Microsoft Solver first on an example scenario similar to the Watershed property, and then take a quiz to demonstrate you understand conceptually how Solver works. Then you'll use Solver to find the optimal rents for some specific Watershed properties, keeping in mind the constraints that no valid rents under the model can be below the 10th percentile or above the 90th percentile.

(Alternative to Solver)

We will give you three new Template Spreadsheets. Template Spreadsheet 4 - Alternatives to Solver - includes a mathematical shortcut to make calculating the rest of the 244 rent levels faster and easier, using algebraic equations rather than Solver.The other two spreadsheets provide column headings and the relevant assumptions for the financial modeling portion of the problem – you will need to fill in the formulas in Excel yourself, using information in the Guide spreadsheets and in the videos and supplementary documents.

2.2.6.Excel:Financial Modelling

Build Forecasting Cash Flow and Profits tables.

2.2.7.Sensitivity Analysis

The financial model we have used for this problem is based on reasonable, conservative assumptions for the fixed and variable costs that might be part of conversion. It is worthwhile to consider how robust the model is – in other words, do small to medium changes in assumptions have a large impact on the overall profitability of the business opportunity? The more sensitive the outcome – in terms of profits or cash flows – is to the inputs, the more skeptical an experienced business person would be about the whole opportunity. It is relatively easy in Excel to change one or two input assumptions – but changing more than two at the same time is much easier to do in a Tableau dashboard

2.2.8.Build up Tableau Dashboard for analysis and decision-makers

Created a dynamically-updated dashboard that allows stakeholders to test the robustness of your model through sensitivity analysis.

2.2.9.Write White Paper

Analysts are routinely starting to be asked to provide white papers to their stakeholders, instead of or in addition to presentations. You will be provided with a template white paper, and asked to fill in certain sections to explain more details of your analysis methods and results.

2.2.10.Create PowerPoint Slides Presentation

You will create and record a concise presentation in which you describe your recommendations to Watershed executives: should they pursue moving into the

short-term rental market or not, and if so, which properties should they convert and what would be the expected implications for cash flow and profits in the conversion year and the year following conversion. You will submit a link to your presentation posted online.

2.2.11.Final Project:Part 1: Tableau Dashboard; Part 2: White Paper; Part 3: Recorded Presentation