

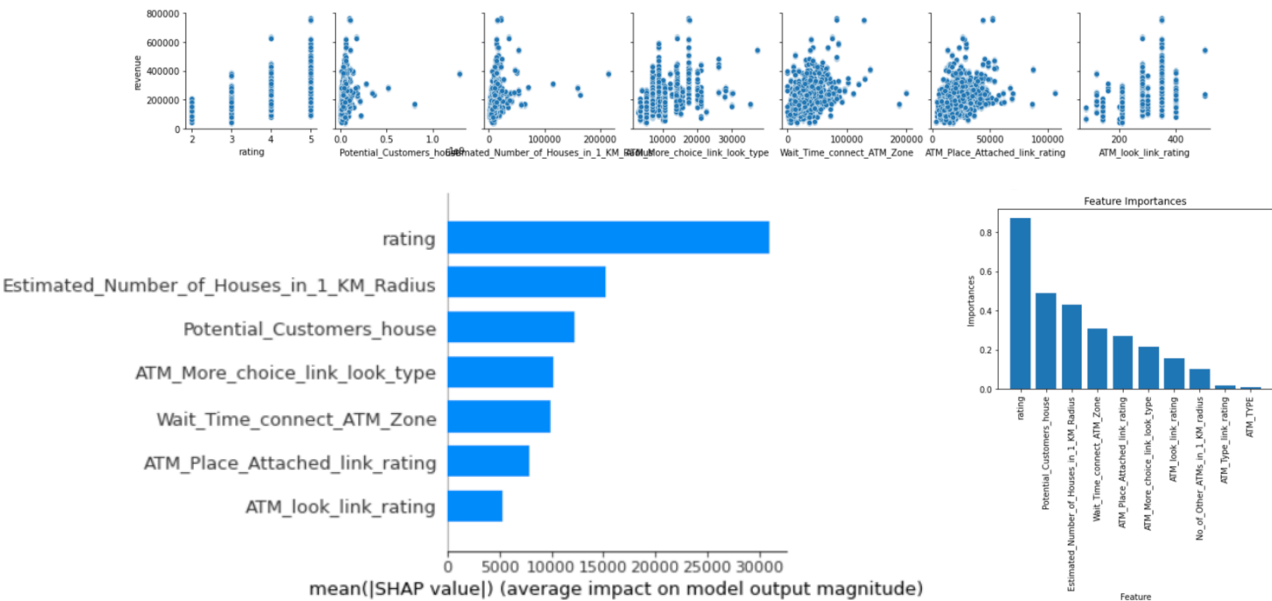
Company is preparing to find a good spot to place a new ATM. With the help of machine learning, I have developed revenue and rating predicted model to identify potential spots for a new ATM. This report will be divided into three parts to prove the rationality of data analysis and give corresponding suggestions: revenue prediction, rating prediction, and recommendation.

The first section is revenue prediction, and obtaining Pearson correlation coefficient of 0.996 demonstrates that can prove revenue prediction results are reasonable.

According to data of permutation importance, I obtain top six feature importance. Rating represents the average rating of the ATM location on a scale of 1 to 5, and it is the most important feature with a permutation importance of 0.889168. This means that higher ratings are associated with higher revenue, and vice versa. This can prove that customers are more likely to use and recommend ATMs that are located in areas with higher ratings. Secondly, potential_customers_house(0.483514) and Estimated_Number_of_Houses_in_1_KM_Radius(0.436707) are related to the house. According to the analysis, the closer to the house the less potential customers and income, and the area of the house should be avoided. Thirdly, Wait_Time_connect_ATM_Zone represents the average wait time for customers to connect to the ATM network. It has a permutation importance of 0.308107, as customers are more likely to use ATMs that are readily available. ATMs built in 'RL' and 'RM' can increase income. Fourthly, ATM_Place_Attached_link_rating represents the rating of the place where the ATM is attached and the number of other ATMs within a 1KM radius, with a permutation importance of 0.272287. Higher ratings for the places where the ATMs are attached, such as petrol bunks, buildings, and shops with more choices around a 1KM radius, have a positive impact on revenue, especially gas stations, as customers are more likely to use ATMs that are located in these areas with higher ratings. Fifthly, ATM_More_choice_link_look_type (0.215367) represents the availability of other ATMs in the town and urban areas. ATMs in town and urban areas with more choices around a 1KM radius and that look normal have a great positive impact on revenue.

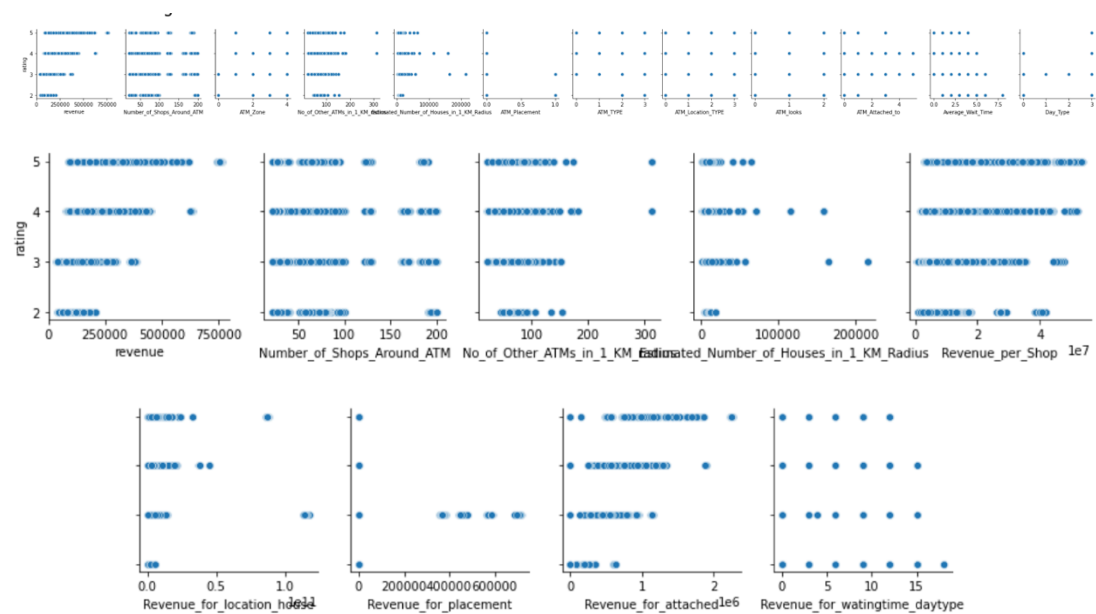
In short, when selecting a location for an ATM, the rating of the location, the availability of other ATMs within a 1KM radius, the average wait time for customers, and the rating of the place where the ATM is attached should all be taken into consideration to maximize revenue.

Scatterplots, SHAP and permutation importance values can justify my recommendations in part 1:



The Second part is the rating prediction, in order to improve the accuracy of this part of the prediction, use another way to convert text data, find closely related data from the first scatter diagram and combine them to get the relationship diagram of the second diagram, predictive analysis based on the data in the second graph. The model has proven to be very accurate with an accuracy, precision, recall, and F1-score of 0.9995. This indicates that the model's predictions are reliable. My recommendation is to place a new ATM in a location where there is high revenue per shop, a large number of more ATM within 1 KM radius, a high revenue for placement, an area with little houses and shorter wait times on working days.

Scatterplots can justify my recommendations in part 2:



The third section is recommendation based on the data analysis and the performance of the two models, ATM location selection consider the following aspects that can increase revenue and get higher rating. First of all, we should choose the town and urban in the RL and RM zones to locate more ATM. Secondly, choosing a place with more ATMs within 1KM is crucial, the waiting time will be shortened and positive influence revenue and rating. Thirdly, it is necessary to avoid areas with many houses, to choose locate around petrol bunk, building and shop, especially gas stations and shop, this is because closing to these infrastructures have more customers and can get more obvious positive impact according to prediction. Fourthly, facing road and looking normal are influential for revenue. In addition, the working day and festivals with low wait time can get higher rating. At the same time, ATM only needs to have basic passbook printing and withdrawal functions, which have little effect on revenue and has no noticeable effect on the rating can be ignore.

In conclusion, I believe that these recommendations can help you make an informed decision regarding the location of a new ATM.