Summary

With the number of pet lovers increasing sharply, how to serve these pets lovers better become an important question. If people want to open a new pet business, there are several questions they need to answer, such as how you could choose your products and where is the most suitable place to start your business.

We try to use data to solve one of the crucial problems, where should we open our mortal-and-brick stores in the United States. After looking into the dataset, we found in the community of Tableau, we selected three variables - the percentage of households with pets, the number of pets per square mile and average personal income since these three variables can measure how successful our business will achieve in three different areas.

We clean the data and re-score the data by using the scale from 0 to 5. The state has the highest number will get the highest score, which is 5. And the score will decrease accordingly. After then we use our formula to calculate the final score of each state and get the top 5 states with the highest score, namely Connecticut, District of Columbia, Maryland, New Jersey, and Massachusetts, from high to low.

After that, we further validated our outcome by conducting cluster analysis both in SPSS and Tableau. According to cluster analysis, 49 states were divided into four clusters, Connecticut, Massachusetts, New Jersey, New York, and Maryland are in the same group, yet D.C is excluded. Based on different findings on New York and D.C and their feathers, we decided to abandon these two states as they have an evident shortage in one of three dimensions.

In conclusion, we settle down four ideal states to start our pet business, which are Connecticut, Maryland, New Jersey, and Massachusetts.

Background

The current population of the United States is 324 million. According to the estimates of the American Pet Products Association, about 54.4 million American families raised 77.8 million pet dogs in 2015. If they are from the ratio of dogs to population, they are about 1 to 4.16. In addition to pet dogs, the American family also raised 85.8 million cats, 7.5 million horses, 100 million fish, 14.3 million birds, 9.3 million reptiles and 12.4 million small animals, such as rabbits, pet pigs, and donkeys, hamsters, etc.

Pets bring happiness to many people and families. People are willing to spend some time and money to look after their pets. Many pet owners treat pets as their children or companions. They not only hang photos of pets at home but also choose a gift for their pets when they want gifts for friends and children every Christmas. According to the American Pet Products Association, the average cost per dog is $1,641, including $551 for a veterinarian, $235 for a regular visit, $330 for food, $333 for a kennel, $62 for a vitamin, and $83 for beauty and $46 for the toy.

With the number of pets increasing, the U.S. has enacted many to protect the legitimate rights and interests of animals. However, we believe some laws are too strict which makes people afraid to buy their pets. So, our company's goal is helping all people who love pets can own their pets. Since we are a newly established company, we need to figure out where should we open our new business company first. To figure out which state our best choice might be, we need to analyze the following questions first.

Firstly, which state has the highest willing to keep pets. People who live in different countries have different life attitudes which determine if they are eager to own pets. For example, if people live in a place where neighbors have pets and they talk about their pets every day, rest of

people who do not have pets are more willing to own their pet in the future because they want to integrate into the living environment and have a common topic with neighbors.

Secondly, which state has the highest per density. A store has a limited range of radiation. If we want to earn more profit, we need to make sure our stores can radiate to more people.

Finally, we need to consider which state has the highest income that can afford our service. In general, people will offer better services to their pet if they are in a wealthy situation. Therefore, offering more high-end services to ensure our company makes more profits.

Analysis Method

Our group chooses three indicators to decide in which states we will open pet companies. Leading index is the number of pets per Square Mile, which measures the density of pets in each state. This higher density of pet, the more comfortable and more efficient for our company to touch customers and pets in a particular place. Therefore, we have more opportunities to promote our products and services and finally earns profits.

We give each state a score to measure the performance of indicators. Below picture (*Fig.1*) is the relationship of numbers of pet per square. The result shows that DC has the extremely highest density of pet since its area is tiny. The difference between New Jersey to Maryland is little, so we make the five states the second group. Delaware to Pennsylvania is the third group and Indiana to Kentucky is the fourth group. Remaining states are the fifth group.

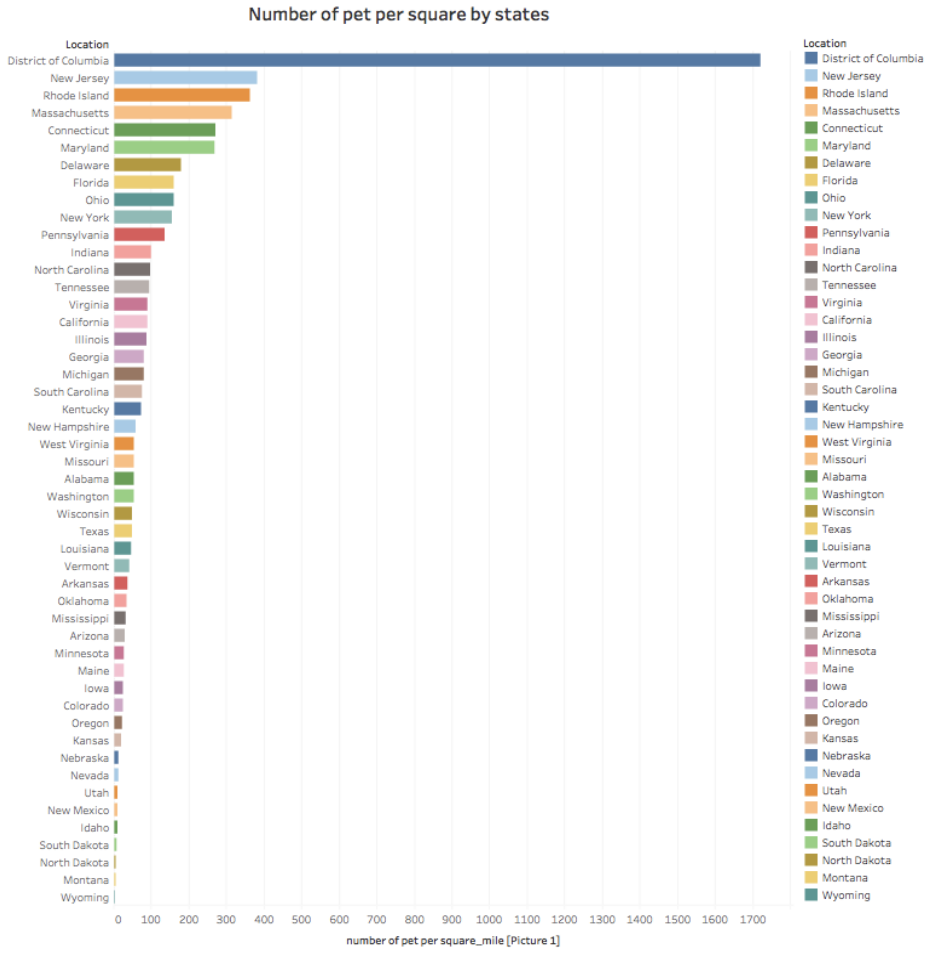

Figure.1 Pet Density of Each State

The second indicator is the Percentage of household with pets, which measures the people's willingness to foster pets. High percentage means people have more enthusiasm to cultivate pets in the state. So that they are more likely to talk topics about pets and spend money on them. Otherwise, if a state only has 30 percentage households with pets, people will be hard to get some interest or useful information about pets so they will not spend more money on pets.

Fig.2 shows that the difference among states is tiny and it is difficult to separate those states with groups. So, we decide to use a gradually descending approach to measure this indicator. We give Vermont (highest percentage) a five score and gradually minus 0.1 in next state. And this approach relatively fits the difference among states.

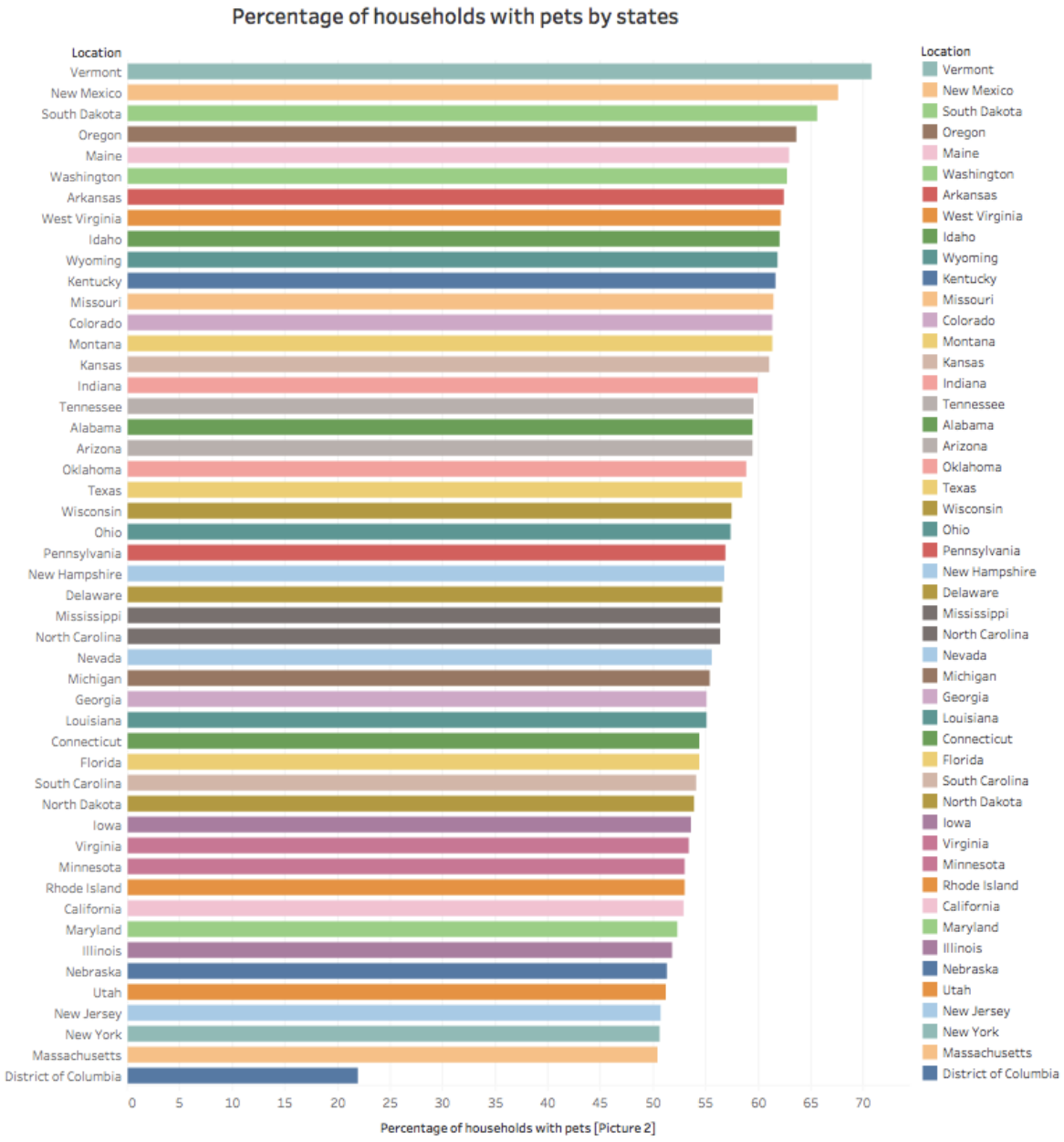

Figure.2 Willingness of raising a pet in each state

The third indicator is Average personal income, which measures people's ability to foster pets. People are more likely to keep pets and spend more money on them if they have higher personal income. So, our company can make more profits when we locate in a wealthy area.

Fig.3 is the average personal income by states. And its pattern and trend are similar to figure 2. So, we still use the gradually descending approach to measure this indicator. DC is five scores and gradually minus 0.1 in the next state.

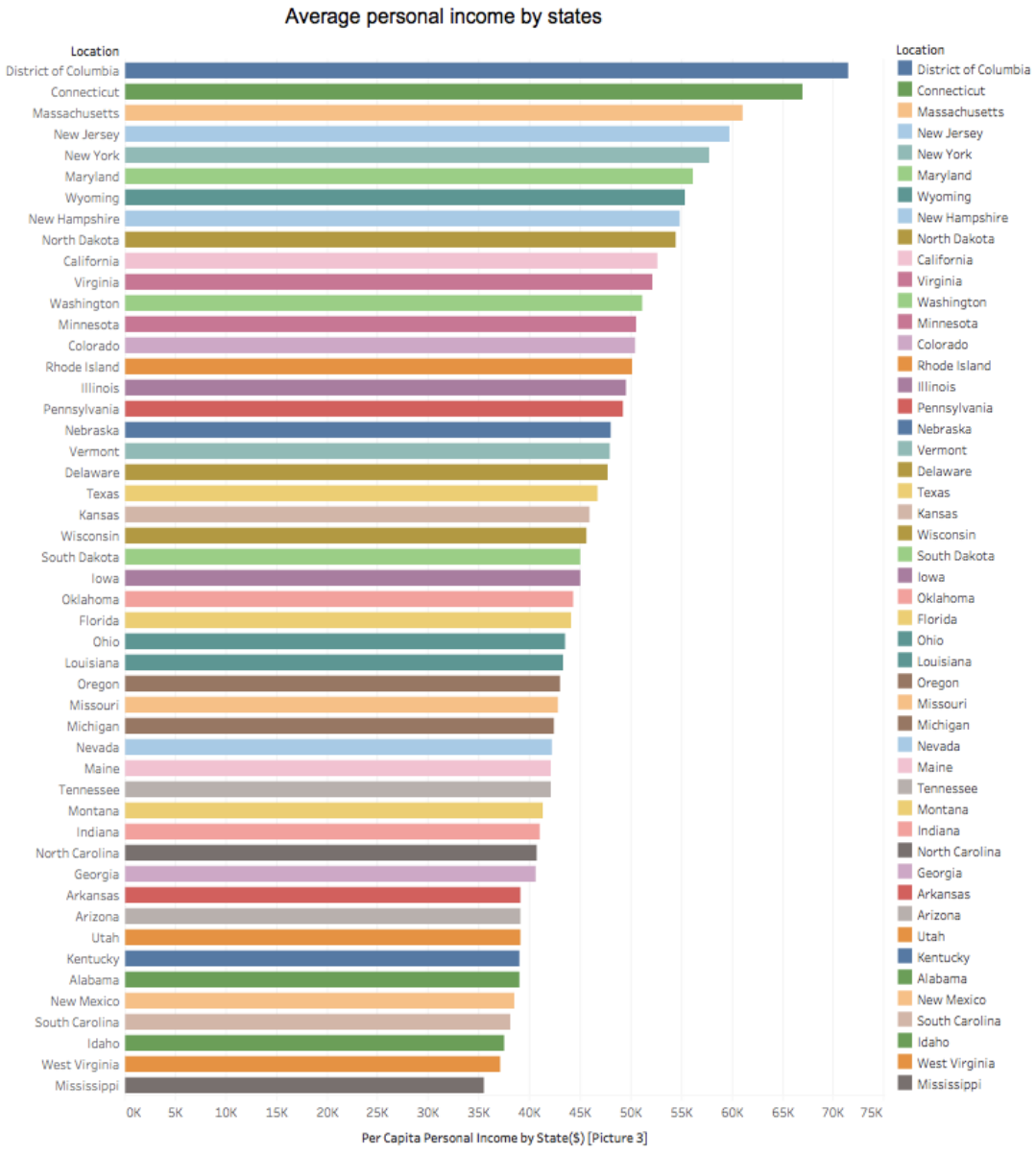

Figure.3 Average Personal Income by State

Calculation

Firstly, we use picked three most important variables; they are Percentage of households with pets, Number of pet per square Mile and Personal Income. The reason why we didn't choose the total number of pets is this information is not as useful as other variables, and it is used in the calculation process of the Percentage of households with a pet. Therefore, if we use it in our analytics, it will be repeated.

Secondly, we have a new score for each state, to prepare for our future analytics. We gave the highest rating to the state has the highest number of these variables. For example, Vermont has the highest percentage of households with pets, so we put five as its score of percentage of households with pets. As a comparison, the District of Columbia has the lowest rate of families with pets, so we put 0.2 as its score. In this way, we can reframe the whole chart and get a new rating for each variable on the same scale, preparing for the calculation process next.

Thirdly, we have to put different weight on these variables. Although these variables are all important in our analysis, some of them should be considered first compared to others. In our case, I think Number of pet per square Mile is a more critical variable because it can show that is there a lot of pets in this community. If this community has a higher number of pets, it means there are a lot of people who keep pets in this area, and we can easily promote our product in this community. It also means the word of mouth effect will be more potent in this community since many people here have pets. And we consider the other two variables are equally important to our business. So, Number of pet per square Mile weight 40%, Percentage of households with pets and Personal Income weight 30% each.

Finally, we run the formula as below.

Final Score = Percentage of households with pets * 30% + Number of pet per square Mile * 40% + Personal Income * 30%

After that, we get a list of all the final score of states. The top 5 states are Connecticut, District of Columbia, Maryland, New Jersey, and Massachusetts, from high to low.

Validation

Due to our subject principle on interval and weight of each viable, it's also essential to test our outcome with another analysis method. According to our analysis structure, our analysis is, in essence, to find out those states which perform well in three variables. Thus, our team conducted the cluster analysis on both SPSS and Tableau.

In SPSS, we conducted hierarchical cluster analysis (HCA) on those 49 states. It turned out that 49 states are divided into four clusters. The first cluster only consists of one state, District of Columbia, due to its superb performance on pet density. Then, Connecticut, Massachusetts, New Jersey, New York, and Maryland are in the second cluster. This cluster feathers relatively high pet density, high willingness on raising a pet and also high ability to keep a pet. We found that these five states conclude four of our five states from our previous analysis. In other words, our outcome is validated meaningful. As for the left one, New York, is excluded account for its relatively-low pet density in this cluster, and this variable is weighted as the most important one in our calculation formula.

In Tableau, the process is relatively straight forward (*Fig.4*), and the outcome presented in the chart below is consistent with what we got from SPSS.

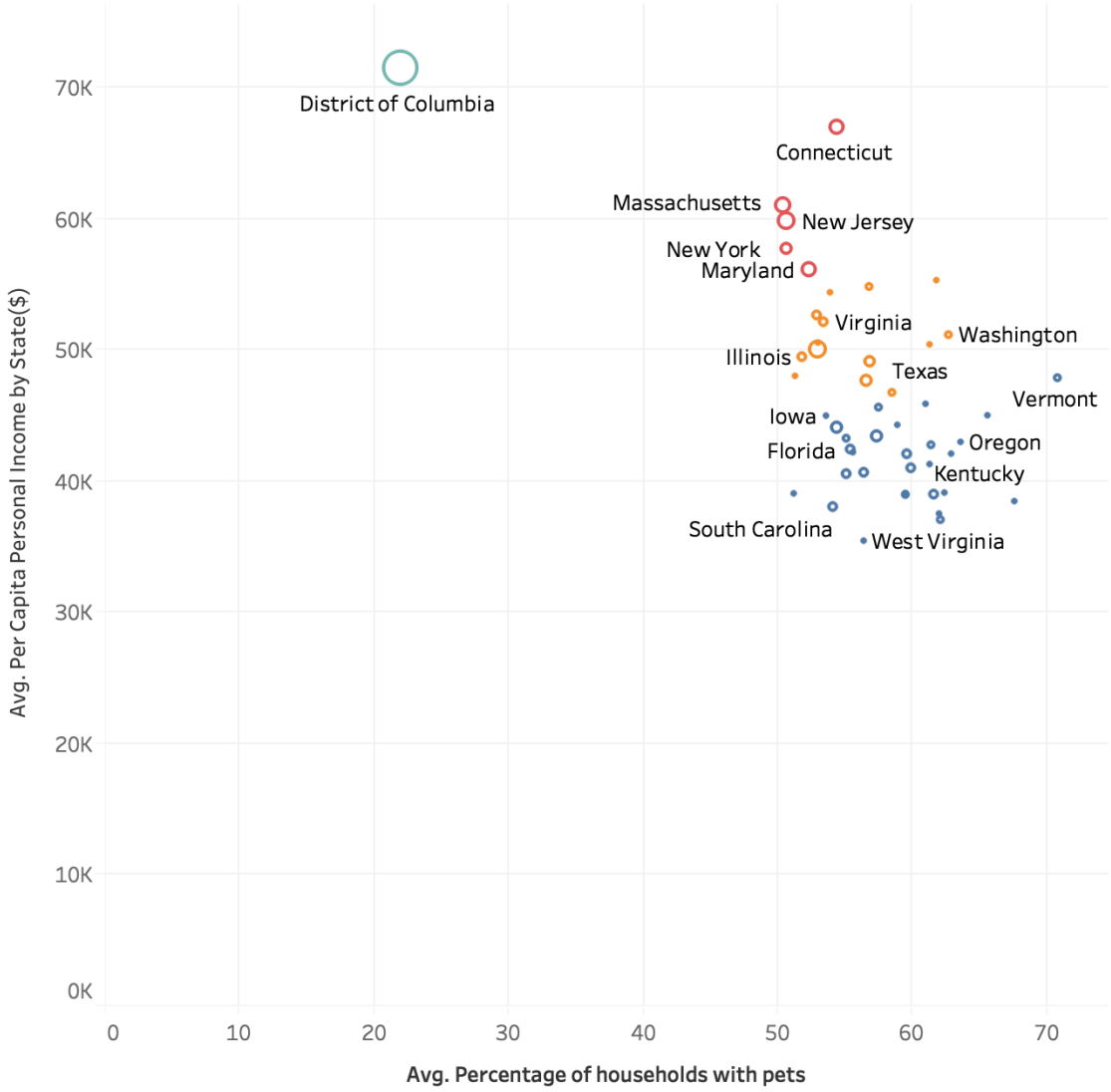

Figure. 4 Cluster Analysis of 49 States in Tableau

To sum up, four of our top five states from calculation formula are validated that they shared the same feathers (in the same cluster). However, the District of Columbia is divided into another group, and New York is missed.

Conclusion

From the outcome from formula and validation, there is no doubt that Connecticut, Massachusetts, New Jersey, and Maryland are ideal for our location selection. They all perform well in our three principles(variables). However, due to the differences between the two analysis, our team need to decide on the District of Columbia and New York furtherly.

As for the District of Columbia, our team tends to treat it as an outlier. In our formula, D.C got the second highest score because of its highest pet density among 49 states, and pet density is weighted highest in three variables. When we look at its willingness to raising a pet, it also has the lowest one among 49 states. It doesn't indicate a definite prospect of our company.

As for New York, it has a relatively low pet density compared with the other four states, which means a limited coverage of potential customers. Besides, its high cost of rent in NY might not guarantee an effective ROI. Therefore, we abandon New York.

All in all, Connecticut, Massachusetts, New Jersey, and Maryland are our final decisions on location selection of brick-and-mortar stores in the U.S.

References

1. Per Capita Personal Income by State https://www.infoplease.com/business-finance/poverty-and-income/capita-personal-income-state (accessed Apr 24, 2019).
2. List of U.S. states and territories by area https://en.wikipedia.org/wiki/List_of_U.S._states_and_territories_by_area (accessed Apr 24, 2019).`