

# Pet store new location selection in Singapore

**YK Chung**

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## Introduction:

Looking around the world, Singapore has its unique culture favor of "East meets West". This country established less than a century ago in 1965. Singapore has several distinct ethnic neighborhoods, including Katong, Kampong Glam, Geylang Serai, Chinatown and Little India[1]. As you can imagine such different ethnic combination, it provides a breeding ground of culture melting pot. Before Singapore independent, British ruled Singapore between 1945 to 1964. A western culture introduced by that period of ruling. Many people like and adapt to raise pet as their accompanist. As regulation to include pet vaccination and pet control, pet service and pet store demand among in the area.

## Business Problem

In this project we will try to find an optimal location to open a new pet store, pet service, or pet cafe in Singapore. As of year 2018, the median Singaporean household income is 9,293 which provides spending capacity on domestic items.

## Data

Based on definition of our problem, factors that will influence our decision are:

- number of existing pet store, pet service, or pet cafe in the neighborhood.
- number of supermarket which sell pet related product such as pet food.
- Potential new pet store distance between to existing pet store, pet service, or pet cafe in the neighborhood, if any

Obtaining initial data methodology.

- Initial geolocations were determinant from postal codes which can be found at file SG.zip [geonames.org](https://www.geonames.org/).
- [Guide To Online Pet Store & Pet Shop Directory In Singapore](#). This website provide a list of current pet store in Singapore.
- [Singapore government data set List of Licensed Vet Centres](#). (File name: list-of-licensed-vet-centres.zip)

Following data sources will be needed to extract/generate the required information:

- More than one neighborhood can exist in several postal codes. For example, in the dataframe above, you will notice that neighborhood Straits Boulevard is listed twice and has two 'Latitude' and 'Longitude': Straits Boulevard appeared twice in geolocation. These two rows will be combined into one row with the 'Latitude', 'Longitude' mean value. The postal code will be consolidated and dropped here which it doesn't provide necessary means for further analysis.
- Foursquare developer account provides [500 Premium call](#) per day. As this limit, an further merge or cut down numbers of Neighborhood by Latitude, Longitude between two points within 1km is necessary.

- Number of pet store obtained from Foursquare developer account comparing to the local data source such as "Guide To Online Pet Store & Pet Shop Directory In Singapore" was less. It might be the limitation from the type of developer account. We are not dived into the different here.

## Neighborhood Candidates

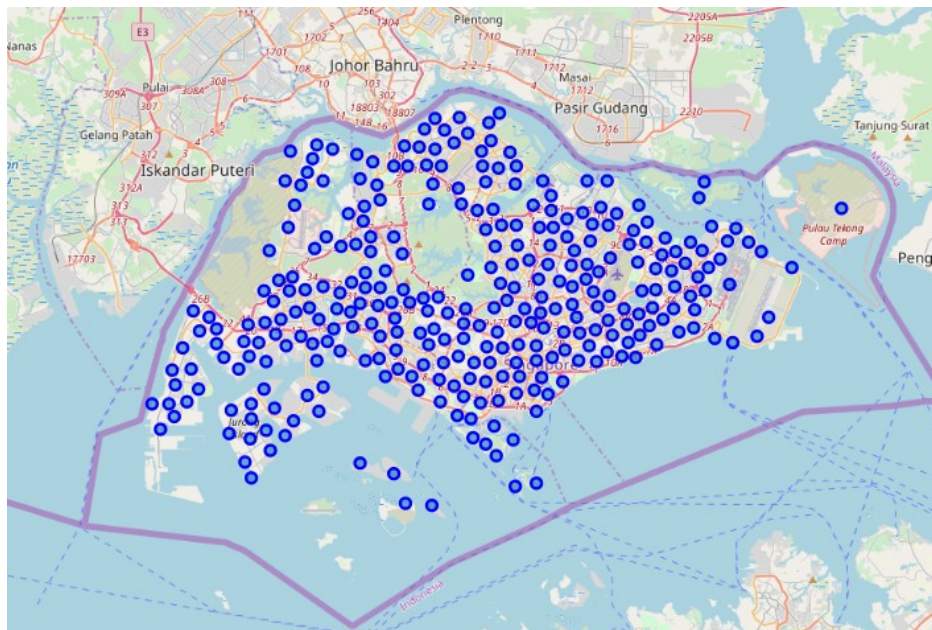
We will calculate three different proposal against to area supermarket which sell pet related product and existing pet store distance. (1). Base on Foursquare developer account data source. (2) Base on "Guide To Online Pet Store & Pet Shop Directory In Singapore" data source. (3) Base on consolidated postal codes area. The new location proposal rule is find a list shortest pet related product and existing pet store distance "d" then select the maximum value in list "d" [max(list(d)).

## Data Cleaning and Reduction

More than one neighborhood can exist in more than one postal code. For example, in the dataframe above, you will notice that neighborhood Straits Boulevard is listed twice and has two 'Latitude' and 'Longitude': Straits Boulevard appeared twice in geolocation. These two rows will be combined into one row with the 'Latitude', 'Longitude' mean value. The postal code will be drop here which it doesn't provide necessary means for further analysis. The postal code data set contain 12,115 in it. It can be consollidate groupby neighborhood and combine within 1km radius area into one new area. After the performaing, the postal code size reduce to 306 neighborhoods.

In the process, postal code is no longer useful in the furthur study, it dropped the postal code when the cleaning the data. The result and neighborhood map would like the following.

	Neighborhood	Latitude	Longitude
0	Abingdon Road	1.368025	103.980287
1	Adam Drive	1.336363	103.814787
2	Adam Park	1.331032	103.812989
3	Adam Road	1.326481	103.813350
4	Adis Road	1.301325	103.847675



## Analysis

Since a new pet store location is the main focus on the study, three cases will be conducted in it. In all cases, the differential factor is distance between the established pet store to new proposed pet store, the farther the better. Therefore, a distance calculation according to geolocation between two points (latitude 1, Longitude 1) to (latitude 2, Longitude 2). Pet stores location map showed below using "Guide To Online Pet Store & Pet Shop Directory In Singapore" data set.

Dataset size:

- FourSquare.com returned 34 established pet stores in Singapore.
- "Guide To Online Pet Store & Pet Shop Directory In Singapore" returned 114 established pet stores in Singapore.



Each case Calculation:

Case 1: FourSquare pet stores dataset distance to related pet venue (supermarket)

	Neighborhood	Latitude	Longitude	Dis
0	Jelebu Road	1.383528	103.770994	0.572147
1	Jelebu Road	1.384114	103.772104	0.671738
2	Yishun Street 22	1.429384	103.835667	5.581320
3	Ang Mo Kio Avenue 3	1.369382	103.849214	0.908581
4	Yishun Avenue 5	1.429384	103.835667	5.581320
5	Ang Mo Kio Avenue 10	1.369382	103.849214	0.908581
6	Tampines Street 81	1.344641	103.938528	3.907012
7	Jurong East Street 31	1.348852	103.723317	0.194803

Case 2: "Guide To Online Pet Store & Pet Shop Directory In Singapore" pet stores distance between related pet venue (supermarket)

	<b>Neighborhood</b>	<b>Latitude</b>	<b>Longitude</b>	Dis (km)
<b>0</b>	Jelebu Road	1.383528	103.770994	0.572147
<b>1</b>	Jelebu Road	1.384114	103.772104	0.671738
<b>2</b>	Yishun Street 22	1.429384	103.835667	0.734166
<b>3</b>	Ang Mo Kio Avenue 3	1.369382	103.849214	0.654444
<b>4</b>	Yishun Avenue 5	1.429384	103.835667	0.734166
<b>5</b>	Ang Mo Kio Avenue 10	1.369382	103.849214	0.654444
<b>6</b>	Tampines Street 81	1.344641	103.938528	0.683376
<b>7</b>	Jurong East Street 31	1.348852	103.723317	0.194803
<b>8</b>	Commonwealth Crescent	1.310442	103.795655	0.691762
<b>9</b>	Hougang Avenue 8	1.372880	103.885139	0.334044
<b>10</b>	Choa Chu Kang Avenue 1	1.380632	103.752645	0.988623
<b>11</b>	Tampines Street 11	1.352143	103.945028	0.674512
<b>12</b>	Tampines Street 11	1.354106	103.944721	0.890570
<b>13</b>	Dover Crescent	1.296480	103.784167	0.940459
<b>14</b>	Thomson Road	1.320587	103.844866	0.126134

Case 3: Pet stores distance between consolidate postal codes which explore the non pet store area.

	<b>Neighborhood</b>	<b>Latitude</b>	<b>Longitude</b>	Dis(Km)
<b>0</b>	Abingdon Road	1.368025	103.980287	3.083916
<b>1</b>	Adam Drive, Adam Park	1.336363	103.814787	1.047464
<b>2</b>	Adam Road	1.326481	103.813350	0.948607
<b>3</b>	Adis Road	1.301325	103.847675	0.988119
<b>4</b>	Admiralty Drive, Admiralty Lane	1.449964	103.816195	2.513929
<b>5</b>	Admiralty Road	1.442133	103.774983	0.542341
<b>6</b>	Admiralty Road East	1.456961	103.829744	2.601996
<b>7</b>	Admiralty Road West, Admiralty Street	1.460440	103.810395	3.844959
<b>8</b>	Ah Hood Road	1.327762	103.846600	0.896570
<b>9</b>	Ah Soo Garden, Ah Soo Walk	1.350165	103.883741	0.328770
<b>10</b>	Aida Street	1.318963	103.927766	0.618653
<b>11</b>	Airline Road	1.379677	103.998654	5.427599
<b>12</b>	Airline Road, Airport Cargo Road	1.351575	103.986342	3.838465
<b>13</b>	Ah Hood Road, Adis Road, Albert Street	1.347078	103.897761	1.778388
<b>14</b>	Albert Winsemius Lane	1.320733	103.769733	0.168454
<b>15</b>	Alexandra Lane	1.275600	103.798100	1.418036
<b>16</b>	Alexandra Lane, Alexandra Terrace	1.285727	103.806965	0.459233

	<b>Neighborhood</b>	<b>Latitude</b>	<b>Longitude</b>	<b>Dis(Km)</b>
<b>17</b>	Alexandra View	1.290610	103.817260	0.759152
<b>18</b>	Aliwal Street	1.302621	103.860792	1.735750
<b>19</b>	Aljunied Avenue 1, Aljunied Avenue 2	1.320500	103.888833	0.692007
<b>20</b>	Aljunied Walk	1.320800	103.878700	1.218729
<b>21</b>	Alkaff Crescent	1.336167	103.873222	2.158926
<b>22</b>	Allamanda Grove	1.323004	103.793892	0.345452
<b>23</b>	Aliwal Street, Allenby Road	1.248375	103.827975	3.341345
<b>24</b>	Almond Avenue, Almond Crescent	1.371806	103.773244	1.371902
<b>25</b>	Airline Road, Alps Avenue	1.364631	103.868274	0.706084
<b>26</b>	Ama Keng Road	1.403500	103.703150	4.874064
<b>27</b>	Amber Gardens, Amber Road	1.301612	103.899482	0.478817
<b>28</b>	Allamanda Grove, Anamalai Avenue	1.281420	103.847326	1.047999
<b>29</b>	Anchorvale Crescent, Anchorvale Drive	1.398394	103.891033	2.050447
<b>30</b>	Anderson Road	1.311686	103.828171	0.717229
<b>31</b>	Andover Road	1.389967	103.974667	3.844981
<b>32</b>	Admiralty Road East, Andrews Avenue	1.337033	103.833286	1.445378
<b>33</b>	Ang Mo Kio Avenue 1	1.364821	103.844680	0.677651
<b>34</b>	Airline Road, Alps Avenue, Ang Mo Kio Avenue 12	1.367557	103.855894	0.575637
<b>35</b>	Ang Mo Kio Avenue 1, Ang Mo Kio Avenue 3, Ang ...	1.376743	103.834126	0.275342
<b>36</b>	Ang Mo Kio Avenue 5, Ang Mo Kio Avenue 6	1.376988	103.848131	0.801766
<b>37</b>	Airline Road, Alps Avenue, Ang Mo Kio Avenue 1...	1.390350	103.847275	1.401091
<b>38</b>	Airline Road, Alps Avenue, Ang Mo Kio Avenue 1...	1.377580	103.869320	0.931855
<b>39</b>	Alkaff Crescent, Angsana Avenue	1.362620	103.830840	0.858609
<b>40</b>	Angsana Drive	1.270100	103.661850	8.586060
<b>41</b>	Anderson Road, Allamanda Grove, Anamalai Avenu...	1.254900	103.660800	10.205887
<b>42</b>	Aliwal Street, Adam Drive, Arcadia Road	1.310383	103.838533	1.093034
<b>43</b>	Anderson Road, Adis Road, Armenian Street	1.297200	103.770820	1.014000
<b>44</b>	Ah Soo Garden, Aroozoo Avenue	1.291900	103.838900	0.469045
<b>45</b>	Anderson Road, Adis Road, Armenian Street, Alj...	1.302417	103.888279	0.907695
<b>46</b>	Ascot Rise	1.334667	103.789822	0.531754
<b>47</b>	Ash Grove	1.333062	103.803075	0.420124
<b>48</b>	Ashwood Grove	1.428670	103.776860	1.078279
<b>49</b>	Allamanda Grove, Astrid Hill	1.320738	103.835294	0.947488
<b>50</b>	Ah Hood Road, Ava Road	1.459800	103.794483	2.954123

	<b>Neighborhood</b>	<b>Latitude</b>	<b>Longitude</b>	<b>Dis(Km)</b>
<b>51</b>	Aviation Drive	1.388300	103.990300	5.072612
<b>52</b>	Anderson Road, Adis Road, Armenian Street, Alj...	1.362600	104.026900	8.182390
<b>53</b>	Ayer Chawan Place	1.271500	103.690600	7.126874
<b>54</b>	Ayer Merbau Road	1.269313	103.718878	6.226975
<b>55</b>	Ayer Rajah Avenue, Aliwal Street, Baghdad Street	1.299650	103.787000	0.798195
<b>56</b>	Adis Road, Bain Street	1.418669	103.827531	1.315656
<b>57</b>	Baker Street	1.409300	103.870400	1.546555
<b>58</b>	Aliwal Street, Bali Lane	1.330340	103.886820	1.774567
<b>59</b>	Anderson Road, Balmoral Crescent	1.282971	103.783714	0.357609
<b>60</b>	Banyan Avenue, Banyan Drive	1.264729	103.675400	8.711314
<b>61</b>	Banyan Road	1.251440	103.674660	9.962383
<b>62</b>	Allamanda Grove, Astrid Hill, Alkaff Crescent,...	1.256900	103.684900	8.845669
<b>63</b>	Ah Hood Road, Bassein Road	1.344350	103.907700	2.529506
<b>64</b>	Allamanda Grove, Anamalai Avenue, Battery Road	1.404267	103.811933	0.643135
<b>65</b>	Bayfront Avenue	1.283467	103.859278	2.208330
<b>66</b>	Aliwal Street, Beach Road	1.312611	103.939022	1.261696
<b>67</b>	Beach View	1.252525	103.819575	2.799444
<b>68</b>	Beatty Lane, Beatty Road	1.312100	103.860400	2.053420
<b>69</b>	Beaulieu Road	1.463400	103.836900	3.130287
<b>70</b>	Bedok Avenue	1.321274	103.953274	0.248777
<b>71</b>	Bedok Avenue, Bedok Close	1.325321	103.934143	0.232698
<b>72</b>	Bedok Industrial Park C	1.336400	103.917500	1.150269
<b>73</b>	Bedok Industrial Park E, Bedok Avenue, Bedok C...	1.336100	103.950100	1.274348
<b>74</b>	Bedok Industrial Park E, Bedok Industrial Park...	1.332610	103.926944	0.034981
<b>75</b>	Bedok Industrial Park E, Ashwood Grove, Beechw...	1.336841	103.935937	0.667729
<b>76</b>	Begonia Crescent, Begonia Drive	1.388919	103.862850	1.195430
<b>77</b>	Beng Wan Road	1.323550	103.865582	1.858235
<b>78</b>	Benoi Crescent	1.319856	103.691267	2.395773
<b>79</b>	Benoi Lane	1.305000	103.674140	4.484023
<b>80</b>	Benoi Lane, Benoi Crescent, Benoi Sector	1.313790	103.680094	3.321606
<b>81</b>	Alexandra Lane, Admiralty Road East, Bermuda Road	1.288700	103.827411	0.075148
<b>82</b>	Bedok Avenue, Allamanda Grove, Bin Tong Park	1.324843	103.823482	0.410893
<b>83</b>	Binchang Rise, Ascot Rise, Binjai Hill	1.349795	103.845989	0.858597
<b>84</b>	Binchang Rise, Bishan Lane	1.343293	103.787029	0.864189



	<b>Neighborhood</b>	<b>Latitude</b>	<b>Longitude</b>	<b>Dis(Km)</b>
<b>85</b>	Beatty Lane, Boon Keng Road	1.276120	103.836169	0.129591
<b>86</b>	Boon Lay Avenue, Boon Lay Drive	1.348685	103.710435	0.342418
<b>87</b>	Alexandra Lane, Admiralty Road East, Bermuda R...	1.333758	103.739621	1.571340
<b>88</b>	Amber Gardens, Bournemouth Road	1.353891	103.875414	0.429336
<b>89</b>	Bowmont Gardens	1.314181	103.920105	0.097283
<b>90</b>	Binchang Rise, Braddell Rise	1.341367	103.841194	1.072126
<b>91</b>	Airline Road, Alps Avenue, Braemar Drive	1.343857	103.863980	1.650896
<b>92</b>	Brani Terminal Avenue, Amber Gardens, Adis Roa...	1.259657	103.832914	1.987077
<b>93</b>	Alkaff Crescent, Angsana Avenue, Bright Hill C...	1.376650	103.733500	1.213828
<b>94</b>	Baker Street, Amber Gardens, Brooke Road	1.312909	103.848923	0.990733
<b>95</b>	Brookvale Drive, Brookvale Walk	1.329980	103.768600	0.928288
<b>96</b>	Buangkok Crescent	1.382929	103.880624	0.893179
<b>97</b>	Buangkok Crescent, Buangkok Green	1.380300	103.895400	1.700683
<b>98</b>	Bukit Batok Central, Bukit Batok Central Link	1.349904	103.749691	0.907152
<b>99</b>	Bukit Batok Central, Bukit Batok East Avenue 2	1.338109	103.757736	1.129490
<b>100</b>	Bukit Batok Central, Bukit Batok East Avenue 2...	1.349600	103.758830	0.127028
<b>101</b>	Bukit Batok Central, Bukit Batok East Avenue 2...	1.373200	103.752800	1.039119
<b>102</b>	Bukit Batok Street 31, Bukit Batok Street 32	1.359302	103.749640	0.186667
<b>103</b>	Bukit Batok West Avenue 8, Bukit Batok West Av...	1.353367	103.740500	1.245412
<b>104</b>	Bukit Chermin Road	1.266600	103.809233	1.703895
<b>105</b>	Buangkok Crescent, Bukit Mugliston	1.348690	103.774140	0.861157
<b>106</b>	Bukit Panjang Ring Road, Beatty Lane, Boon Ken...	1.383067	103.768090	0.333853
<b>107</b>	Bukit Purmei Avenue, Bukit Purmei Road	1.275000	103.824200	0.573925
<b>108</b>	Bukit Purmei Avenue, Bukit Teresa Close	1.320213	103.784850	1.396987
<b>109</b>	Buangkok Crescent, Bukit Mugliston, Binchang R...	1.340350	103.777900	0.199291
<b>110</b>	Boon Lay Avenue, Bulim Street	1.356533	103.702100	1.614374
<b>111</b>	Bukit Batok Central, Bukit Batok East Avenue 2...	1.339124	103.884124	1.548921
<b>112</b>	Buroh Crescent	1.312175	103.697950	3.322672
<b>113</b>	Buroh Crescent, Anderson Road, Adis Road, Arme...	1.315050	103.724650	1.206580
<b>114</b>	Alkaff Crescent, Butterfly Avenue	1.326400	103.753200	2.008712
<b>115</b>	Baker Street, Amber Gardens, Brooke Road,	1.312400	103.895189	0.398941

	<b>Neighborhood</b>	<b>Latitude</b>	<b>Longitude</b>	<b>Dis(Km)</b>
	Admi...			
<b>116</b>	Canberra Crescent, Canberra Drive	1.445158	103.831075	1.378891
<b>117</b>	Bedok Industrial Park E, Bedok Industrial Park...	1.325457	103.919814	0.463984
<b>118</b>	Allamanda Grove, Astrid Hill, Alexandra Lane, ...	1.429117	103.789033	1.560034
<b>119</b>	Changi Business Park Avenue 1, Changi Business...	1.335640	103.963540	1.808573
<b>120</b>	Changi Coast Walk	1.317200	103.976333	2.364789
<b>121</b>	Changi East Close	1.318533	104.004233	5.427495
<b>122</b>	Changi East Drive	1.330750	104.011400	6.298679
<b>123</b>	Changi Ferry Road	1.373333	104.006567	6.063329
<b>124</b>	Changi North Crescent, Changi North Rise	1.348104	103.970254	2.409152
<b>125</b>	Changi Business Park Avenue 1, Changi South Av...	1.318696	103.909961	0.176567
<b>126</b>	Chapel Close, Airline Road, Alps Avenue, Chart...	1.307996	103.906454	0.144180
<b>127</b>	Alexandra View, Chatsworth Park, Buangkok Cres...	1.301109	103.819773	0.623054
<b>128</b>	Changi Business Park Avenue 1, Changi South Av...	1.329358	103.718908	0.730932
<b>129</b>	Changi Business Park Avenue 1, Changi South Av...	1.337043	103.712936	1.041594
<b>130</b>	Chinese Cemetery Path 4	1.373600	103.687200	3.612243
<b>131</b>	Bukit Batok Central, Bukit Batok East Avenue 2...	1.336300	103.730900	0.945222
<b>132</b>	Choa Chu Kang Avenue 2, Bukit Batok Central, B...	1.378272	103.742947	0.194349
<b>133</b>	Choa Chu Kang Crescent, Choa Chu Kang Avenue 2...	1.402380	103.748437	0.621620
<b>134</b>	Choa Chu Kang Crescent, Choa Chu Kang North 6,...	1.392795	103.747726	0.494825
<b>135</b>	Aliwal Street, Adam Drive, Arcadia Road, Cleme...	1.354675	103.693100	1.486790
<b>136</b>	Albert Winsemius Lane, Clementi Avenue 2, Broo...	1.309210	103.769238	0.605269
<b>137</b>	Adam Road, Cluny Park, Bowmont Gardens, Coldst...	1.316677	103.813352	1.757857
<b>138</b>	Albert Winsemius Lane, Clementi Avenue 2, Coll...	1.292257	103.849671	0.823138
<b>139</b>	Albert Winsemius Lane, Commonwealth Avenue Wes...	1.301000	103.800150	0.456714
<b>140</b>	Anchorvale Crescent, Compassvale Street,	1.391202	103.897277	2.738226



	<b>Neighborhood</b>	<b>Latitude</b>	<b>Longitude</b>	<b>Dis(Km)</b>
	Alber...			
<b>141</b>	Airline Road, Alps Avenue, Corfe Place	1.251157	103.845810	2.971632
<b>142</b>	Changi Business Park Avenue 1, Changi South Av...	1.315929	103.800792	1.011188
<b>143</b>	Airline Road, Alps Avenue, Corfe Place, Cove A...	1.390547	103.837847	1.257892
<b>144</b>	Cove Drive, Cove Grove	1.240925	103.834560	4.030233
<b>145</b>	Albert Winsemius Lane, Clementi Avenue 2, Bego...	1.364098	103.882992	0.312979
<b>146</b>	Defu Avenue 2, Defu Lane 1	1.360018	103.901373	1.599477
<b>147</b>	Defu Avenue 2, Defu Lane 2	1.355066	103.893026	1.050141
<b>148</b>	Baker Street, Amber Gardens, Brooke Road, Ah S...	1.304912	103.809962	1.050848
<b>149</b>	Ascot Rise, Din Pang Avenue	1.379800	103.984800	4.044382
<b>150</b>	Chapel Close, Duku Lane	1.416505	103.757238	2.460514
<b>151</b>	Chapel Close, Bowmont Gardens, East Coast Terrace	1.304543	103.925096	0.967464
<b>152</b>	Buangkok Crescent, Alkaff Crescent, Eden Grove	1.312767	103.790581	1.305974
<b>153</b>	Edgedale Plains, Edgefield Plains	1.397920	103.913046	2.312316
<b>154</b>	Elias Green, Elias Road	1.370850	103.942438	0.863132
<b>155</b>	Adam Road, Cluny Park, Baker Street, Amber Gar...	1.360553	103.762289	1.203088
<b>156</b>	Enterprise Road	1.333735	103.703856	1.616474
<b>157</b>	Baker Street, Amber Gardens, Brooke Road, Admi...	1.428800	103.767700	1.557815
<b>158</b>	Aljunied Avenue 1, Eunost Avenue 5b, Aljunied A...	1.322050	103.898900	0.741257
<b>159</b>	Alkaff Crescent, Butterfly Avenue, Faber Crescent	1.318122	103.758923	0.912369
<b>160</b>	Faculty Avenue	1.347733	103.683400	1.143119
<b>161</b>	Enterprise Road, Adam Road, Cluny Park, Beatty...	1.343325	103.796650	0.964137
<b>162</b>	Fernvale Close	1.394187	103.880800	0.903070
<b>163</b>	Fernvale Close, Fernvale Link	1.389218	103.871849	0.388070
<b>164</b>	Flora Drive, Albert Winsemius Lane, Clementi A...	1.356812	103.965512	1.458205
<b>165</b>	Buangkok Crescent, Alkaff Crescent, Eden Grove...	1.328783	103.907350	0.878752
<b>166</b>	Golden Drive, Golden Rise	1.355263	103.861656	1.290207
<b>167</b>	Bukit Purmei Avenue, Bukit Teresa Close,	1.368950	103.908912	2.517939

	<b>Neighborhood</b>	<b>Latitude</b>	<b>Longitude</b>	<b>Dis(Km)</b>
	Grove...			
<b>168</b>	Guillemard Close, Guillemard Crescent	1.309400	103.879200	0.294330
<b>169</b>	Gul Avenue, Gul Circle	1.315065	103.670212	3.765050
<b>170</b>	Hai Sing Crescent, Anderson Road, Balmoral Cre...	1.365196	103.893485	0.760229
<b>171</b>	Harbourfront Avenue, Harbourfront Place	1.264800	103.818300	1.444074
<b>172</b>	Adam Road, Cluny Park, Baker Street, Amber Gar...	1.340360	103.766700	0.661012
<b>173</b>	Hai Sing Crescent, Buangkok Crescent, Buangkok...	1.373756	103.885685	0.447569
<b>174</b>	Baker Street, Amber Gardens, Brooke Road, Admi...	1.328886	103.694557	1.432424
<b>175</b>	Chapel Close, Aljunied Avenue 1, Jalan Afifi	1.358300	103.815750	1.736892
<b>176</b>	Guillemard Close, Bowmont Gardens, Jalan Azam	1.327276	103.684160	1.769830
<b>177</b>	Aliwal Street, Adam Drive, Arcadia Road, Cleme...	1.327012	103.857188	0.942271
<b>178</b>	Flora Drive, Jalan Batalong	1.438367	103.700567	6.873167
<b>179</b>	Buangkok Crescent, Alkaff Crescent, Eden Grove...	1.313744	103.715152	1.704974
<b>180</b>	Adam Road, Cluny Park, Baker Street, Amber Gar...	1.344646	103.960777	1.816620
<b>181</b>	Adam Road, Cluny Park, Baker Street, Amber Gar...	1.416350	103.707650	4.829945
<b>182</b>	Albert Winsemius Lane, Clementi Avenue 2, Bego...	1.290189	103.797467	0.626679
<b>183</b>	Adam Road, Cluny Park, Baker Street, Amber Gar...	1.375000	103.716500	2.813527
<b>184</b>	Adam Road, Cluny Park, Baker Street, Amber Gar...	1.352860	103.837224	0.200836
<b>185</b>	Bedok Industrial Park E, Bedok Industrial Park...	1.431433	103.754133	2.760708
<b>186</b>	Adam Road, Cluny Park, Baker Street, Amber Gar...	1.382887	103.723820	2.133958
<b>187</b>	Bedok Avenue, Jalan Limau Bali	1.428445	103.825486	0.335830
<b>188</b>	Adam Road, Cluny Park, Baker Street, Amber Gar...	1.379181	103.960974	2.110140
<b>189</b>	Golden Drive, Ash Grove, Jalan Pandan	1.418300	103.969900	5.395001
<b>190</b>	Adam Road, Cluny Park, Baker Street, Amber Gar...	1.323208	103.729123	0.594762
<b>191</b>	Guillemard Close, Albert Winsemius Lane, Cleme...	1.363096	103.972540	2.145241
<b>192</b>	Jalan Tanjong	1.329432	103.943037	0.501282

	<b>Neighborhood</b>	<b>Latitude</b>	<b>Longitude</b>	<b>Dis(Km)</b>
<b>193</b>	Jalan Tari Dulang, Jalan Tari Payong	1.400030	103.870404	0.559968
<b>194</b>	Joo Koon Circle, Joo Koon Crescent	1.326106	103.672930	2.674640
<b>195</b>	Alexandra Lane, Admiralty Road East, Bermuda R...	1.346207	103.733202	0.309478
<b>196</b>	Jurong Hill	1.318500	103.707500	2.061178
<b>197</b>	Alexandra Lane, Admiralty Road East, Bermuda R...	1.279727	103.711493	5.333953
<b>198</b>	Boon Lay Avenue, Jurong West Avenue 3	1.350631	103.722244	0.106373
<b>199</b>	Boon Lay Avenue, Jurong West Avenue 3, Jurong ...	1.347455	103.700245	1.182533
<b>200</b>	Jurong West Street 92, Ah Hood Road, Bassein R...	1.340656	103.689750	0.211387
<b>201</b>	Buangkok Crescent, Alkaff Crescent, Eden Grove...	1.337400	103.900700	1.889390
<b>202</b>	Bowmont Gardens, Bedok Avenue, Kew Avenue, Bed...	1.452550	103.788150	1.888832
<b>203</b>	Chapel Close, Bowmont Gardens, Kurau Grove	1.436620	103.743833	3.802556
<b>204</b>	Enterprise Road, Anderson Road, Admiralty Road...	1.223120	103.860800	6.462777
<b>205</b>	Changi Business Park Avenue 1, Changi South Av...	1.323600	103.962700	0.833757
<b>206</b>	Flora Drive, Airline Road, Alps Avenue, Corfe ...	1.301200	103.830275	0.479114
<b>207</b>	Lim Chu Kang Lane 1, Lim Chu Kang Lane 2	1.424627	103.711847	4.928808
<b>208</b>	Lim Chu Kang Lane 1, Lim Chu Kang Lane 5a, Lim...	1.433260	103.715080	5.333243
<b>209</b>	Lim Chu Kang Lane 6d, Lim Chu Kang Lane 6f	1.442680	103.717600	6.006605
<b>210</b>	Guillemard Close, Albert Winsemius Lane, Cleme...	1.335866	103.853031	0.188834
<b>211</b>	Changi Business Park Avenue 1, Changi South Av...	1.387183	103.923517	0.657393
<b>212</b>	Adam Road, Cluny Park, Baker Street, Amber Gar...	1.397600	103.738200	0.935413
<b>213</b>	Adam Road, Cluny Park, Baker Street, Amber Gar...	1.416833	103.793667	2.934173
<b>214</b>	Fernvale Close, Aliwal Street, Adam Drive, Arc...	1.388700	103.699200	4.875186
<b>215</b>	Guillemard Close, Albert Winsemius Lane, Cleme...	1.400450	103.832650	1.698735
<b>216</b>	Adam Road, Cluny Park, Baker Street, Amber Gar...	1.373553	103.968100	2.114987
<b>217</b>	Mandai Avenue	1.414500	103.809900	1.529543
<b>218</b>	Mandai Estate	1.406672	103.758668	1.712439

	<b>Neighborhood</b>	<b>Latitude</b>	<b>Longitude</b>	<b>Dis(Km)</b>
<b>219</b>	Mandai Estate, Mandai Quarry Road, Flora Drive...	1.404000	103.790700	2.991920
<b>220</b>	Marina Coastal Drive	1.269450	103.860875	2.572624
<b>221</b>	Marina East Drive	1.288750	103.877450	1.500120
<b>222</b>	Marina Coastal Drive, Chapel Close, Marine Cre...	1.280800	103.868133	2.550859
<b>223</b>	Marine Parade Road, Harbourfront Avenue, Beatt...	1.305313	103.915989	0.595920
<b>224</b>	Albert Winsemius Lane, Clementi Avenue 2, Bego...	1.441100	103.784200	0.686355
<b>225</b>	Meranti Crescent	1.244133	103.687700	9.970004
<b>226</b>	Meranti Lane	1.226533	103.674933	12.346828
<b>227</b>	Alexandra Lane, Admiralty Road East, Bermuda R...	1.236300	103.670800	11.614632
<b>228</b>	Fernvale Close, Aliwal Street, Adam Drive, Arc...	1.416997	103.846850	2.232243
<b>229</b>	Anderson Road, Adis Road, Armenian Street, Neo...	1.399900	103.821900	0.595894
<b>230</b>	Neo Tiew Crescent	1.439824	103.728229	5.170949
<b>231</b>	Neo Tiew Harvest Lane, Lim Chu Kang Lane 1, Ne...	1.419400	103.721600	3.724470
<b>232</b>	Northpoint Drive	1.427100	103.836250	0.948481
<b>233</b>	Northshore Crescent, Northshore Drive	1.419314	103.906429	4.574649
<b>234</b>	Pandan Avenue	1.302337	103.749087	1.625620
<b>235</b>	Pandan Avenue, Joo Koon Circle, Anderson Road,...	1.303969	103.758600	0.579269
<b>236</b>	Pasir Ris Avenue	1.381943	103.944687	0.476860
<b>237</b>	Changi Business Park Avenue 1, Changi South Av...	1.372900	103.951437	1.225694
<b>238</b>	Pasir Ris Coast Industrial Park 3	1.392050	103.932450	0.997015
<b>239</b>	Pasir Ris Avenue, Pasir Ris Drive 10	1.403400	103.927350	2.160966
<b>240</b>	Pasir Ris Coast Industrial Park 3, Pasir Ris A...	1.379000	103.932300	0.440466
<b>241</b>	Pasir Ris Street 11, Pasir Ris Avenue, Pasir R...	1.365553	103.957476	0.639310
<b>242</b>	Buroh Crescent, Anderson Road, Adis Road, Arme...	1.308545	103.732982	2.147771
<b>243</b>	Albert Winsemius Lane, Clementi Avenue 2, Bego...	1.283825	103.683325	6.466228
<b>244</b>	Benoi Crescent, Pioneer Road North	1.322847	103.652287	4.822683
<b>245</b>	Pioneer Sector 1, Pioneer Sector 2	1.304603	103.657147	5.596893
<b>246</b>	Pioneer Sector Lane, Northshore Crescent, Pong...	1.297275	103.666700	5.627968

	<b>Neighborhood</b>	<b>Latitude</b>	<b>Longitude</b>	<b>Dis(Km)</b>
<b>247</b>	Changi Business Park Avenue 1, Changi South Av...	1.292116	103.779480	1.008926
<b>248</b>	Pulau Bukom Kechil	1.228800	103.767600	6.205853
<b>249</b>	Pulau Busing	1.236000	103.745700	6.511187
<b>250</b>	Albert Winsemius Lane, Clementi Avenue 2, Bego...	1.302182	103.717591	2.746903
<b>251</b>	Pulau Sakeng	1.209700	103.775400	8.181376
<b>252</b>	Pulau Sakra	1.263200	103.702800	7.377463
<b>253</b>	Pulau Sebarok	1.208267	103.792333	8.302509
<b>254</b>	Pulau Tekong Besar	1.401400	104.059000	12.555692
<b>255</b>	Edgedale Plains, Punggol Central	1.408090	103.966242	4.244389
<b>256</b>	Northshore Crescent, Anchorvale Crescent, Comp...	1.402229	103.902485	3.381117
<b>257</b>	Anderson Road, Adis Road, Armenian Street, Res...	1.291400	103.863900	1.836602
<b>258</b>	Albert Winsemius Lane, Clementi Avenue 2, Bego...	1.390396	103.907632	2.426311
<b>259</b>	Pulau Sakra, Sakra Avenue	1.220506	103.846918	6.343224
<b>260</b>	Pulau Sakra, Sakra Road	1.254000	103.697100	8.555501
<b>261</b>	Baker Street, Seletar Aerospace Heights, Selet...	1.403700	103.858533	1.823822
<b>262</b>	Baker Street, Seletar Aerospace Heights, Ang M...	1.419488	103.893818	3.537542
<b>263</b>	Bedok Avenue, Jalan Limau Bali, Admiralty Driv...	1.438658	103.824587	0.970885
<b>264</b>	Seraya Place, Alexandra View, Chatsworth Park,...	1.285500	103.722033	4.500636
<b>265</b>	Shipyards Crescent, Adam Road, Cluny Park, Bake...	1.302040	103.685020	4.435518
<b>266</b>	Pulau Sakra, Sakra Avenue, Guillemard Close, S...	1.333600	103.863567	1.209832
<b>267</b>	Northshore Crescent, Anchorvale Crescent, Comp...	1.304650	103.870725	0.687176
<b>268</b>	Choa Chu Kang Crescent, Sungei Kadut Avenue	1.419380	103.697120	6.032456
<b>269</b>	Choa Chu Kang Crescent, Sungei Kadut Lane, Cha...	1.420614	103.746248	2.614963
<b>270</b>	Tagore Drive, Tagore Industrial Avenue	1.387625	103.827450	1.163595
<b>271</b>	Tampines Avenue	1.366573	103.926518	1.813565
<b>272</b>	Elias Green, Tampines Avenue 12	1.347462	103.929226	0.422414
<b>273</b>	Elias Green, Tampines Avenue 12, Tampines Aven...	1.350450	103.950700	0.842012
<b>274</b>	Tampines Avenue 4, Elias Green, Tampines	1.348190	103.938431	0.643426

	<b>Neighborhood</b>	<b>Latitude</b>	<b>Longitude</b>	<b>Dis(Km)</b>
	Avenu...			
<b>275</b>	Elias Green, Tampines Avenue 12, Tampines Aven...	1.360700	103.948311	0.563573
<b>276</b>	Elias Green, Tampines Avenue 12, Tampines Aven...	1.377640	103.920890	1.102615
<b>277</b>	Elias Green, Tampines Street 62, Tampines Stre...	1.362227	103.938227	1.593988
<b>278</b>	Northshore Crescent, Anchorvale Crescent, Comp...	1.314100	103.988400	3.748766
<b>279</b>	Teban Gardens Crescent, Edgedale Plains, Tebin...	1.324480	103.741040	1.845439
<b>280</b>	Bukit Batok Central, Bukit Batok East Avenue 2...	1.310499	103.630435	7.608378
<b>281</b>	Bukit Batok Central, Bukit Batok East Avenue 2...	1.382790	103.753120	1.145547
<b>282</b>	Telok Blangah Green, Anderson Road, Adis Road,...	1.278800	103.813200	0.646903
<b>283</b>	Tembusu Avenue, Anderson Road, Adis Road, Arme...	1.274250	103.675375	7.678895
<b>284</b>	Benoi Crescent, Pioneer Road North, Tuas Avenue 1	1.339834	103.746258	1.685333
<b>285</b>	Tuas Avenue 10, Tuas Avenue 11	1.330465	103.647465	5.043838
<b>286</b>	Benoi Crescent, Pioneer Road North, Tuas Avenu...	1.321376	103.641445	5.993328
<b>287</b>	Tuas Basin Close, Bukit Batok Central, Bukit B...	1.313360	103.652620	5.329341
<b>288</b>	Tuas Bay Lane, Benoi Crescent, Pioneer Road No...	1.296700	103.636100	7.914098
<b>289</b>	Tuas Link 1, Tuas Link 2	1.334600	103.637435	6.057459
<b>290</b>	Tuas South Avenue 10, Tuas South Avenue 12	1.286914	103.625471	9.517514
<b>291</b>	Tuas South Avenue 14	1.274600	103.621567	10.752246
<b>292</b>	Bukit Batok Central, Bukit Batok East Avenue 2...	1.265900	103.625400	11.156790
<b>293</b>	Tuas South Avenue 10, Tuas Bay Lane, Tuas Sout...	1.295975	103.623442	9.096883
<b>294</b>	Tuas South Avenue 9	1.283650	103.640650	8.555095
<b>295</b>	Tuas South Avenue 9, Bukit Batok Central, Buki...	1.257586	103.616064	12.537174
<b>296</b>	Bukit Batok Central, Bukit Batok East Avenue 2...	1.275555	103.633118	9.784069
<b>297</b>	Tuas South Avenue 10, Tuas Bay Lane, Tuas Sout...	1.274500	103.610700	11.662672

	<b>Neighborhood</b>	<b>Latitude</b>	<b>Longitude</b>	<b>Dis(Km)</b>
<b>298</b>	Alkaff Crescent, Butterfly Avenue, Faber Cresc...	1.418856	103.864525	2.744708
<b>299</b>	Adam Road, Cluny Park, Baker Street, Amber Gar...	1.292380	103.762100	1.183216
<b>300</b>	Allamanda Grove, Astrid Hill, Alexandra Lane, ...	1.439811	103.794917	1.819608
<b>301</b>	Allamanda Grove, Astrid Hill, Alexandra Lane, ...	1.444133	103.807367	2.721556
<b>302</b>	Bowmont Gardens, Bedok Avenue, Kew Avenue, Ah ...	1.428750	103.798800	2.493463
<b>303</b>	Woodlands Industrial Park E8, Allamanda Grove,...	1.452267	103.800867	2.910271
<b>304</b>	Northpoint Drive, Yishun Avenue 9, Canberra Cr...	1.428931	103.847639	1.229274
<b>305</b>	Northpoint Drive, Bedok Avenue, Jalan Limau Ba...	1.437737	103.843337	0.592276

## Result

1. Base on Foursquare data, a new pet store proposed location which already has supermarket but the nearest pet store within approximate 5.5Km at Yishun Street 22 or Yishun Avenue 5. Yishun Street 22 or Yishun Avenue 5 are close proximate to each other less than 1Km.
2. Base on case 2 data, a new pet store proposed location which already has supermarket but the nearest pet store existing within approximate 0.98Km at Choa Chu Kang Avenue 1.
3. Base on case 3 data, a new pet store proposed location farthest distance that non-of pet store in the area is approximate 12.55Km away from any existing established pet store at Pulau Tekong Besar.

## Discussion

Reviewing all three cases, the proposal new pet store location was very different. Although the methodology is the same, the initial data source would make a big impact on the result. In this comprehensive analysis, we have to caution getting data source from commercial data provide which limited a quality of data at least on this study. Before getting a set of data from commercial site, one should understand the site restriction on different kinds of account limitation.

We can scrape case 1 result. We know the data set pet store is much smaller. We will keep case 2 and case 3 for further study to including more factors into consideration such as populate, social acceptance on keeping pet, income level, government veteran offices. It is interesting to see more factors adding into new site selecting process might affect the final result.

Next step is to add government veteran office data which can obtain at [List of Licensed Vet Centres](#) on the analysis.



## **Conclusion**

It is a question of blue ocean or red sea strategy. We know case 1 is not valid result. It scrapes on the study. Case 2 result is in very close approximation of already established pet store location, 0.95km away. It will create a high competition and tension between new store. More data on other factors has to include on the study before a final decision to make. Case 3 is a easy to accept. Using the consolidated postal code against the existing pet store gives the most satisfied result(blue ocean). However, a question should raise after visualizing between existing pet store location on map. One can easily see that most of established pet stores are very centralizer in the middle ranger. Outer perimeter area (outskirts area) no matter east, west or south, non of pet store is in that area. Case 3 suggests area exactly locating in north east outskirts. This is a cautionary. Other factors should be understood before the finalize selection.