UBC LED

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Evaluation Goal: What are the five most common business types in each local area in Vancouver? How has this changed in the last 15 years?

Introduction

Our original plan was to build a machine learning application that would predict the type of the business based on its name. To do this, we first put all of the business names from the given CSV files into a bag of words. We treat this as a classification problem, using the business names to predict the business types. However, there are more than 60,000 businesses, and there are more than 40,000 words in our bag of words. Thus, we will need to make a matrix of size 60,000 by 40,000 to accommodate for such data. Based on such a big matrix, it takes approximately 19GB of RAM to run, which our computers cannot handle. In addition, since we are using Matlab, we cannot make good use of IBM's Data Scientist Workbench.

As a result, we approached another goal: Of each of the local areas in Vancouver, what are the five most common business types? How has this changed in the last 15 years? To answer these, we looked at data from years 1999, 2003, 2007, 2011, and 2015.

Evaluation Method

Here is a rundown of our program:
1) For each CSV file, we retrieve the local area and business type columns.
2) We clean and remove any empty rows or cells and businesses operating outside of Vancouver
3) We count the number of business types located in each local area
4) We then sort the business types based on their frequencies
5) Finally, we record these results in separate CSV files

Findings

We observed that in 2015, Vancouver is dominated by offices and residential business types. In West End, we noticed that in 1999, historic dining lounges were in the top 5 business types; however, there has been an increase in apartments over the decade. In 1999, there are 13 areas in Vancouver with one-family dwellings as their top business type. In 2015, there are only 8 one-family dwellings as their top business type, and other areas have secondary suites as their top business type. These trends tell us that residential areas are expanding, and the increase of secondary suites could imply that, with regards to the escalating prices of real estate, more people are opting for less expensive housing.

In three key local areas we examined (West End, Central Business/Downtown, Kitsilano), we can observe a similar trend. The number of restaurants has slightly increased in trend over the years as population and economy grows. The number of computer services, on the other hand, has grown rapidly over the years from 1999 to 2015. This trend of computer services becoming more prominent could be an indication of the growing computer software startup industry. The number of wholesale dealers has gradually gone down over the years. Central Business/Downtown is the area that exhibits the most abrupt changes.

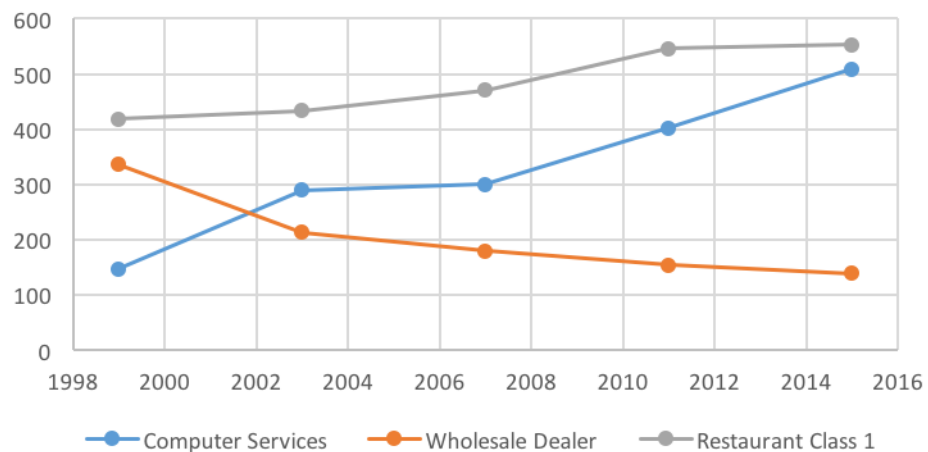# The Five Most Common Business Types in Vancouver Local Areas – Year 2015

Local Areas	Business Types				
	Top 1	Top 2	Top 3	Top 4	Top 5
West End	Office	Apartment House	Restaurant Class 1	Retail Dealer	Apartment House Strata
Central Business/Downtown	Office	Retail Dealer	Financial Services	Restaurant Class 1	Computer Services
Strathcona	Office	Wholesale Dealer	Manufacturer	Retail Dealer	Retail Dealer - Food
Grandview-Woodland	Apartment House	Office	One-Family Dwelling	Multiple Dwelling	Retail Dealer
Hastings-Sunrise	One-Family Dwelling	Secondary Suite - Permanent	Contractor	Office	Retail Dealer
West Point Grey	One-Family Dwelling	Office	Retail Dealer	Secondary Suite - Permanent	Apartment House
Kitsilano	Apartment House	Office	Multiple Dwelling	Retail Dealer	Health Services
Fairview	Office	Health Services	Retail Dealer	Apartment House	Restaurant Class 1
Mount Pleasant	Office	Apartment House	Retail Dealer	Multiple Dwelling	Duplex
Dunbar-Southlands	One-Family Dwelling	Office	Contractor	Secondary Suite - Permanent	Retail Dealer
Arbutus Ridge	One-Family Dwelling	Office	Health Services	Apartment House	Retail Dealer
Shaughnessy	Office	One-Family Dwelling	Multiple Dwelling	Contractor	Apartment House
South Cambie	One-Family Dwelling	Health Services	Office	Duplex	Secondary Suite - Permanent
Riley Park	Secondary Suite - Permanent	One-Family Dwelling	Office	Retail Dealer	Restaurant Class 1
Kensington-Cedar Cottage	Secondary Suite - Permanent	One-Family Dwelling	Retail Dealer	Office	Contractor
Renfrew-Collingwood	One-Family Dwelling	Secondary Suite - Permanent	Office	Contractor	Retail Dealer
Kerrisdale	Office	One-Family Dwelling	Apartment House	Health Services	Retail Dealer
Oakridge	Health Services	Office	Retail Dealer	One-Family Dwelling	Contractor
Sunset	Secondary Suite - Permanent	One-Family Dwelling	Contractor	Retail Dealer	Office
Victoria-Fraserview	One-Family Dwelling	Contractor	Secondary Suite - Permanent	Office	Health Services
Killarney	One-Family Dwelling	Contractor	Office	Secondary Suite - Permanent	Retail Dealer
Marpole	Apartment House	Office	One-Family Dwelling	Contractor	Wholesale Dealer

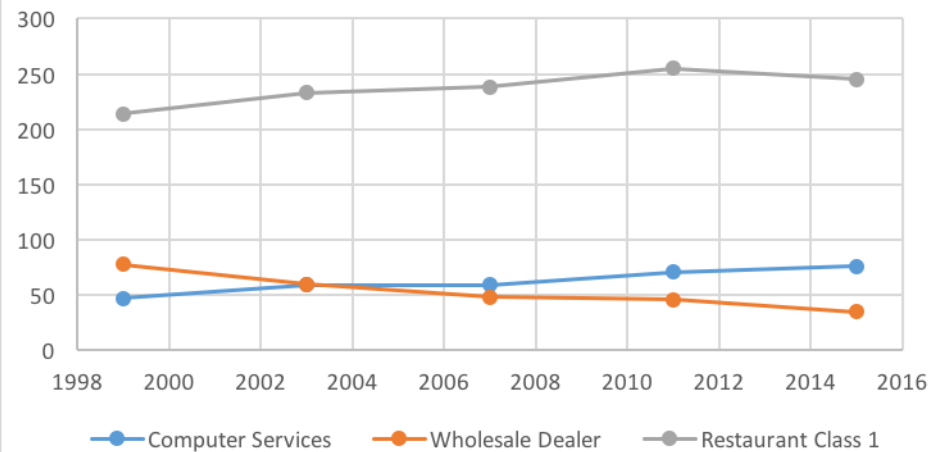# The Five Most Common Business Types in Vancouver Local Areas – Year 1999

Local Areas	Business Types				
	Top 1	Top 2	Top 3	Top 4	Top 5
West End	Office	Apartment House	Retail Dealer	Restaurant Class 1	Dining Lounge/Room *Historic*
Central Business/Downtown	Office	Retail Dealer	Financial Services	Restaurant Class 1	Ltd Service Food Establishment
Strathcona	Manufacturer	Retail Dealer - Food	Retail Dealer	Wholesale Dealer	Office
Grandview-Woodland	Apartment House	One-Family Dwelling	Duplex	Retail Dealer	Office
Hastings-Sunrise	One-Family Dwelling	Secondary Suite - Phase Out *Historic*	Retail Dealer	Office	Contractor
West Point Grey	One-Family Dwelling	Office	Retail Dealer	Health Services	Secondary Suite - Phase Out *Historic*
Kitsilano	Apartment House	Office	Retail Dealer	Multiple Dwelling	One-Family Dwelling
Fairview	Office	Health Services	Retail Dealer	Apartment House	Restaurant Class 1
Mount Pleasant	Apartment House	Office	Retail Dealer	Multiple Dwelling	Duplex
Dunbar-Southlands	One-Family Dwelling	Office	Retail Dealer	Secondary Suite - Phase Out *Historic*	Contractor
Arbutus Ridge	One-Family Dwelling	Office	Retail Dealer	Apartment House	Health Services
Shaughnessy	One-Family Dwelling	Office	Multiple Dwelling	Retail Dealer	Apartment House
South Cambie	One-Family Dwelling	Health Services	Office	Duplex	Apartment House
Riley Park	One-Family Dwelling	Retail Dealer	Office	Duplex	Apartment House
Kensington-Cedar Cottage	One-Family Dwelling	Retail Dealer	Office	Duplex	Secondary Suite - Phase Out *Historic*
Renfrew-Collingwood	One-Family Dwelling	Office	Secondary Suite - Phase Out *Historic*	Retail Dealer	Wholesale Dealer
Kerrisdale	One-Family Dwelling	Office	Retail Dealer	Apartment House	Health Services
Oakridge	One-Family Dwelling	Retail Dealer	Office	Health Services	Ltd Service Food Establishment
Sunset	One-Family Dwelling	Retail Dealer	Secondary Suite - Phase Out *Historic*	Wholesale Dealer	Office
Victoria-Fraserview	One-Family Dwelling	Office	Secondary Suite - Phase Out *Historic*	Retail Dealer	Contractor
Killarney	One-Family Dwelling	Office	Retail Dealer	Contractor	Secondary Suite - Phase Out *Historic*
Marpole	One-Family Dwelling	Apartment House	Office	Wholesale Dealer	Duplex

Changes in the Quantity of Three Key Business Types from 1999 to 2015