



Synonym Discovery for Bing Local

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Background

Business Synonym: Alternative name for the same or a closely related business

Types of Synonyms

- ▶ *Strong Synonyms:* Refer to the same business
 - ▶ Ex: Subway ↔ Subway Inc
- ▶ *Partial Synonyms:* Refer to a closely related business
 - ▶ Ex: Sears ↔ Sears Auto Center

Windows 8.1 Search Charm

- ▶ Now connected to Bing
- ▶ Search for local businesses with Bing without opening web browser



Search



Share



Start



Devices



Settings

Objective

Improve Bing Local search results through synonym discovery

- ▶ Add business synonyms to Bing's database
 - ▶ Provides more information for the search engine to operate
- ▶ Produce results for previously ignored queries
 - ▶ Example: Show results if user queries "7 11" instead of "7-Eleven"

Before

After



7 11

7 11 Job Application - Work available in your area.
Payscale.com/Job_Application
Find a job today! Payscale™
Search Full Time Jobs · Search Part Time Jobs · Search Temporary Jobs

University of BC-Gate 7
Bing Local
1 Agronomy Rd, Greater Vancouver
Directions

Exit 1/HWY-99/N
Bing Local
2 Hwy-1, Greater Vancouver
Directions

Web results for 7 11

Fast, convenient, 7-Eleven®. Oh thank Heaven®.
<https://www.7-eleven.com>
Visit 7-Eleven, home of Big Gulp fountain soft drinks, Big Bite hot dogs, Slurpee drinks, and other convenient, healthy and fast food items. Satisfy your snack attack ...

7-11 Vancouver - Toronto Restaurants, Dentists, Bars, Beauty ...
www.yelp.ca/search?find_desc=7-11&find_loc=Vancouver%2C+BC
Reviews on 7 11 in Vancouver 7 Eleven, 7 Eleven, 7 Eleven, 7 Eleven, 7 Eleven, 7 Eleven Food Stores, 7 Eleven Food Stores, 7 Eleven Food Stores, 7 Eleven, 7 Eleven ...

7-Eleven - Downtown - Vancouver, BC - Toronto Restaurants ...
www.yelp.ca/biz/7-eleven-vancouver-6
★ ★ ★ ★ Rating: 2.5/5 - 5 Yelp reviews
It's a shame there aren't more of these around Vancouver. (the store, ... at the same time 7-11's leave me with the impression that they expect to be stolen from.

7 11

7-Eleven Franchise - Own this franchise!
www.BizQuest.com/Find-a-Franchise
Get free info on over 1,000 quality franchises at

7 Eleven Jobs - Apply and Start a New Job.
7Eleven.WorkGrabber.net
We are Hiring Now - Apply Today!
Full Time Jobs · Part Time Jobs · Warehouse Jobs · Customer Service Jobs

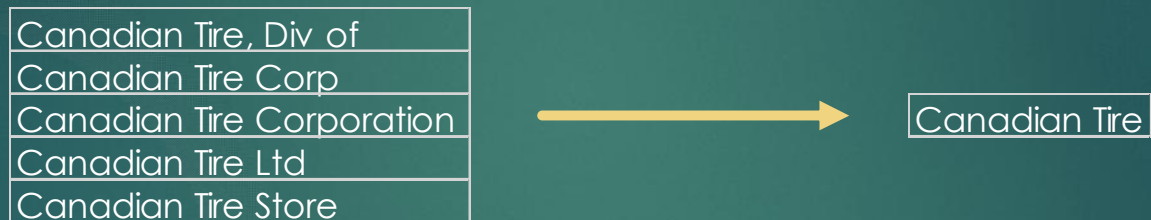
Fast, convenient, 7-Eleven®. Oh thank Heaven®.
<https://www.7-eleven.com>
Visit 7-Eleven, home of Big Gulp fountain soft drinks, Big Bite hot dogs, Slurpee drinks, and other convenient, healthy and fast food items. Satisfy your snack attack ...

- 984W Broadway W, Vancouver · (604) 732-7919
Website · Directions
- 8602 Granville St, Vancouver · (604) 263-2533
Website · Directions
- 1199 W Pender St, Vancouver · (604) 689-1526
Website · Directions
- 3295 22nd Ave E, Vancouver · (604) 433-5727
Website · Directions
- 99 Smithe St, Vancouver · (604) 669-7394
Website · Directions
- 3695 10th Ave W, Vancouver · (604) 731-4181
Website · Directions
- 6904 Victoria Dr, Vancouver · (604) 713-9601
Website · Directions
- 310 Robson St, Vancouver · (604) 678-8305
Website · Directions

Additional Applications

Business Name Normalization

- ▶ Determine a standard name for synonymous entities



- ▶ Improve user experience
 - ▶ Local results should show the most popular name for a particular business

Additional Applications (cont.)

Website Composition

- ▶ Use synonym database to propagate website information between synonymous entities

<i>Alberta Wood Products</i>	http://www.albertawood.com/	→	<i>Alberta Wood Products</i>	http://www.albertawood.com/
<i>Alberta Wood</i>	No Website		<i>Alberta Wood</i>	http://www.albertawood.com/

- ▶ Provide more information about queried entities
 - ▶ Can be applied to other fields (ex: phone numbers)
 - ▶ Directly increases Bing's LDCG

*LDCG is a metric that indicates the quality of search results

Synonym Discovery Techniques

Strong Synonyms

Acronyms/Expansions

- ▶ Liquor Control Board of Ontario ↔ LCBO
- ▶ ACA ↔ Alberta Conservation Association

Unigrams (differs by one word)

- ▶ Tim Horton's ↔ Tim Horton's Café

Bigrams (differs by two words)

- ▶ Total Image ↔ Total Image Beauty Salon

Partial Synonyms

Partial Acronyms/Expansions

- ▶ CCA ↔ Canada Christian Academy Brampton Inc
- ▶ Canadian Standards Association ↔ CSA Group

Partial Matches

- ▶ Esso ↔ Virginia-Park Esso

Numerical Prefixes/Suffixes

- ▶ L.C.B.O. ↔ L.C.B.O. #126
- ▶ Subset of partial matches (indicates store #)

Results

Synonym Discovery

	Type	Biz Names	Synonyms	Precision
Strong Synonyms	Acronyms/Expansions	1,341	1,600	88%
	Unigrams	109,411	119,074	93%
	Bigrams	4,651	4,768	91%
	Total	114,001	125,437	90%
Partial Synonyms	Partial Acronyms/Expansions	2,232	3,527	86%
	Partial Matches	62,869	107,304	100%
	Numerical Prefixes/Suffixes	2,084	4,292	100%
	Total	64,306	110,350	93%
All Synonyms	Total	178,307	235,787	

*Totals are not a simple sum of each individual count as duplicate synonyms must be removed

Name Normalization

Strong Synonyms

- ▶ Distinct Business Names Normalized: 20,099
- ▶ Distinct Entities Normalized: 38,910

**Partial synonyms* not used in name normalization as a normalized name should only be applied if the synonymous entities are interchangeable

Website Composition

Strong Synonyms

- ▶ Distinct Entities Affected: 19,672

Partial Synonyms

- ▶ Distinct Entities Affected: 29,473

Conclusion

- ▶ Summary of Synonym Discovery
 - ▶ Improve search results
 - ▶ Normalize business names
 - ▶ Share website information between entities
- ▶ Future discovery techniques
 - ▶ Translation (using Bing API)
 - ▶ Cosine similarity (numerical indicator of the similarity between two business names)

*Bing is a translation API service offered by Microsoft