Using Natural Language Processing to Help Develop a Frame of Energy Suppliers

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Study Background

Residential Energy Consumption Survey (RECS)

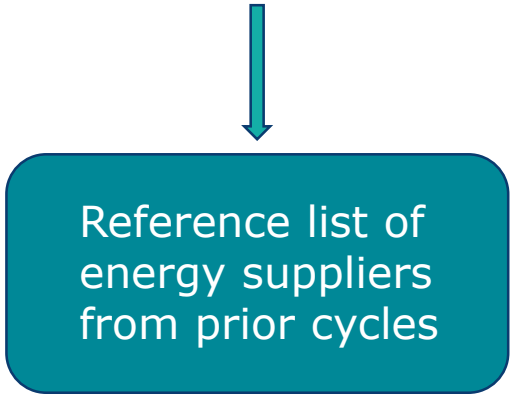
- Household Survey
  - 19,000 households
- Energy Supplier Survey (ESS)
  - Case = Household + Energy Source — 30,000 cases
  - Respondent = Energy Supplier — 3,000 suppliers

Assign each CASE to a SUPPLIER

Data Sources

Residential Energy Consumption Survey (RECS)

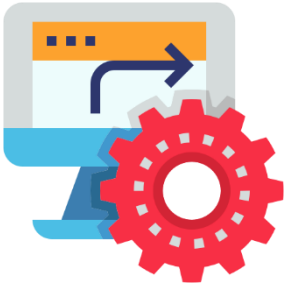
- Household Survey
- Energy Supplier Survey (ESS)



- Self-administered web/paper
- Supplier name, account number: open text fields

Matching Challenge

Step 1A Match supplier names from HH survey to suppliers on reference list



Reference List

- WASHINGTON GAS

Write-in Responses

- Washington Gas
- Washington Gas Light
- Washington Gas Light Company
- WGL
- Washington
- Wash Gas
- DC Gas
- …

Natural Language Processing to the Rescue!

- Search for variations on supplier names
- Python script
- Compare HH-provided supplier name against reference list
- Calculate Levenshtein distance between input text and reference list candidates
  - Value between 0 and 1
  - 0 = identical

the number of single-character edits – including insertions, deletions, and substitutions – to transform the input by the respondent into a given candidate on the reference list

Natural Language Processing to the Rescue!

- Set threshold for *likely* matches
  - Score between 0.0 and 0.2: likely match
  - Score between 0.2 and 1.0: no likely match

- Set output guidelines
  - If there's a likely match: output 1 (best) candidate
  - If there's no likely match: output 10 candidates with lowest distance score

Reviewing the Output

	ESSID	Supplier	Distance	Expanded Lookup Supplier	Lookup State	Lookup Supplier	Matched State	Matched	Project Supplier ID	State
☐	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
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MATCH NO MATCH

Improving the Odds, Reducing False Positives

- Expand the reference list
  - Manually: add known aliases
  - Programmatically:
    - Expand common abbreviations (e.g., "CO" to "COMPANY")
    - Create acronyms or other shortened names (e.g., "Washington Gas Light" to "WGL")

- Add additional rules
  - Use other data elements (e.g., check HH state against reference list state)

Assessing the Results

- Even with 100% review of output, still much faster than matching manually

- Category flag results

Category flag	# Cases	% Cases (all)	% Cases (1-3)
1. Likely match – confirmed	10,213	34%	42%
2. Possible match – confirmed	4,901	16%	20%
3. No confirmed match	9,456	32%	38%
4. No supplier name given	5,419	18%	

Further Implications and Applications

- How could we improve on our results?
  - Expand the reference list
  - Refine the rules

Category flag	# Cases
1. Likely match – confirmed	10,213
2. Possible match – confirmed	4,901
3. No confirmed match	9,456
4. No supplier name given	5,419

Further Implications and Applications

- Looking beyond the initial data
  - Do the results from this early stage in the study correlate to any results from the later stages? YES!

Category flag	% Disavowed
1. Likely match – confirmed	4%
2. Possible match – confirmed	5%
3. No confirmed match	8%
4. No supplier name given	22%

Category flag	% Completed
1. Likely match – confirmed	97%
2. Possible match – confirmed	95%
3. No confirmed match	92%
4. No supplier name given	84%

Thank You!

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