Support Vector Machine Based Orthographic Disambiguation

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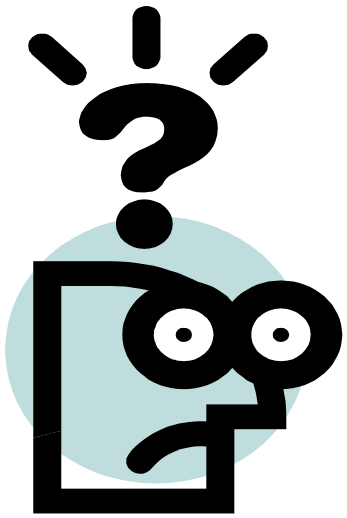
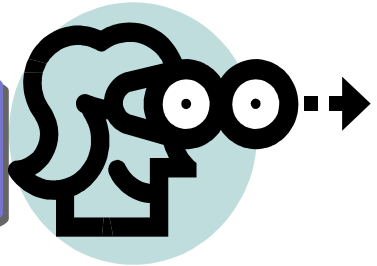


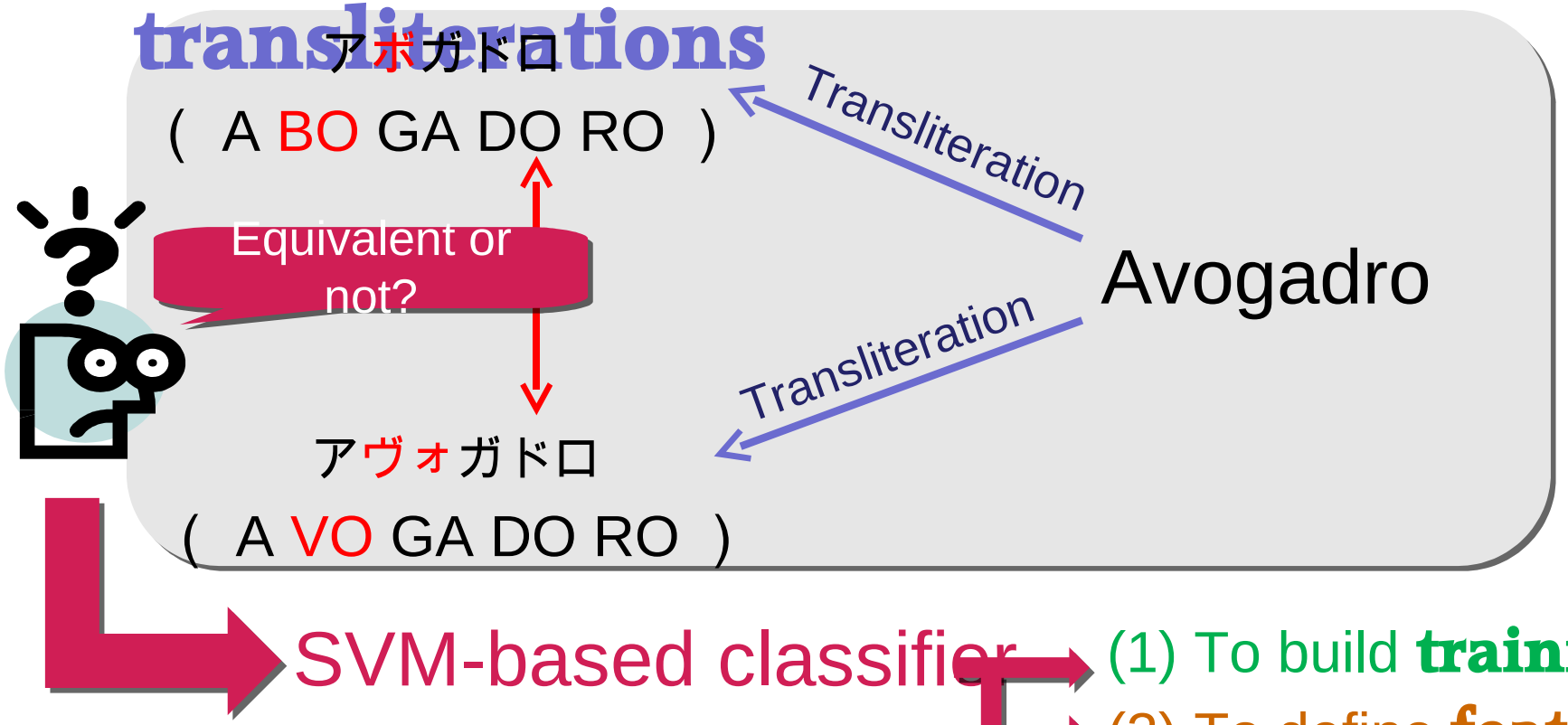
"center" and "centre" are equivalent?

We focus on Japanese, but the proposed method does not depend on languages



Background

- Japanese in particular contains orthographic variation, because of tons of **transliterations**



(1) Training-set

- **Positive** example: a term pair, which are spelled differently, but have the same meaning

in multiple translation dictionaries

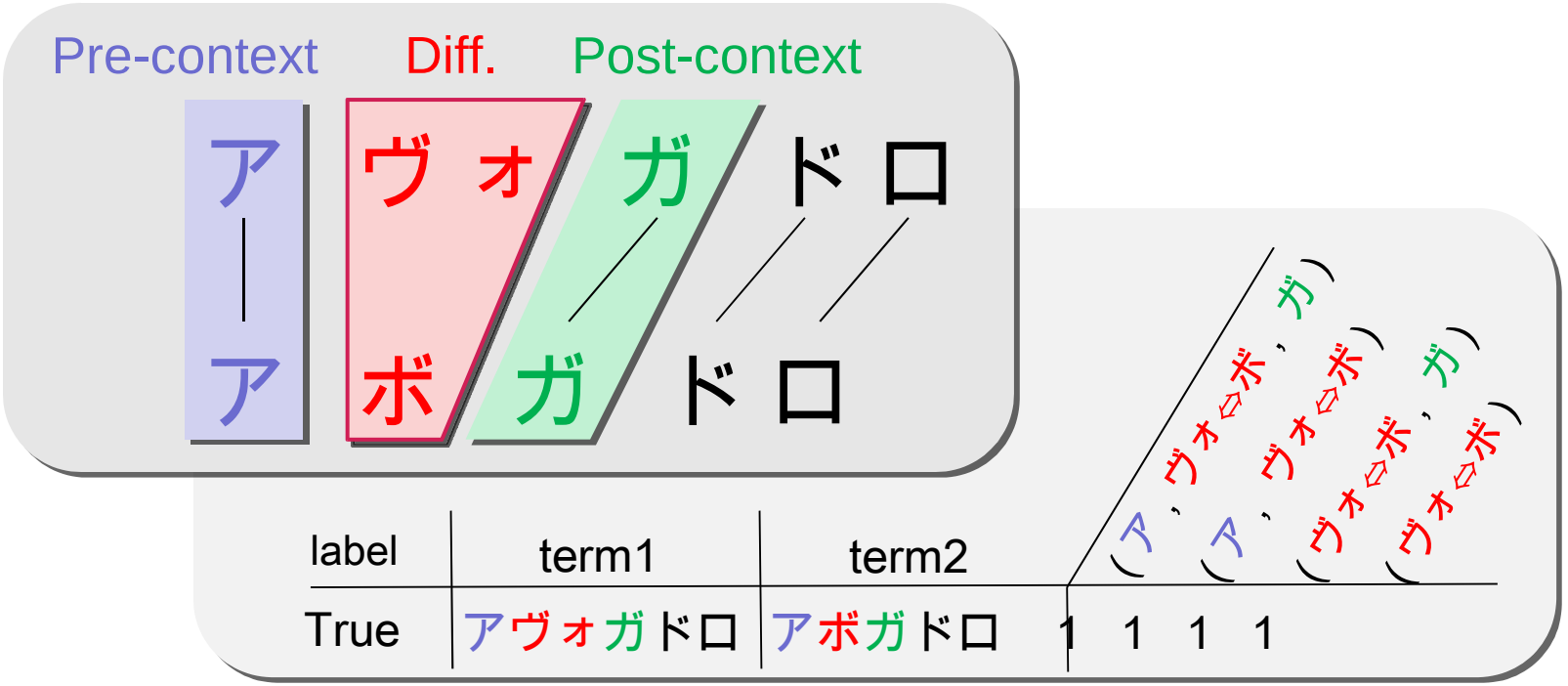
Same English Translation

- **Negative** example: a term pair, which are spelled differently and have different meanings.

Different English Translation

(2) Features for SVM

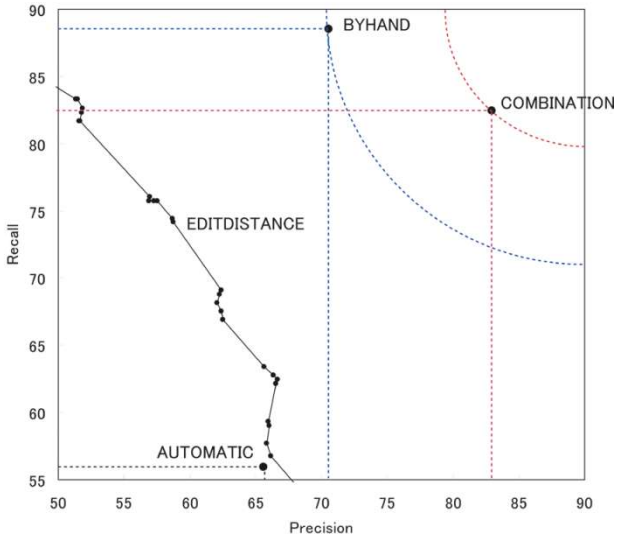
- different characters & its surrounding characters (window size=1; pre-context & post-context)



- Their combinations = **features**

Experiments

- Test-set: 883 Medical term pairs (312 positive)
- Methods:
  - (1) EDIT DISTANCE (*th*): IF SIM > *th* THEN +1
  - (2) BYHAND: SVM + 4,130 handmade training-set
  - (3) AUTOMATIC: SVM + 68,608 automatically built training-set
  - (4) COMBINATION: SVM + all training-set (BYHAND+AUTO
- Results:



$$Precision = \frac{\#\text{ of pairs found and correct}}{\text{total }\#\text{ of pairs found}},$$

$$Recall = \frac{\#\text{ of pairs found and correct}}{\text{total }\#\text{ of pairs correct}},$$

$$Accuracy = \frac{\#\text{ of pairs correct}}{\text{total }\#\text{ of pairs in test-set}}.$$

methods	Precision	Recall	Accuracy
EDIT-DISTANCE(0.91)	67.2%(164/244)	52.6% (164/312)	70.9% (626/883)
BYHAND	70.4%(276/392)	**88.4% (276/312)**	82.7% (731/883)
AUTOMATIC	65.7%(177/269)	56.7% (177/312)	74.2% (656/883)
COMBINATION	**82.9%(258/311)**	82.6% (258/312)	**87.8% (776/883)**

* The performance in EDIT-DISTANCE(0.91) showed the highest accuracy in various TH values.

Conclusion

- Discussion
  - Why AUTOMATIC < BYHAND
    - Because of Corpus specific styles (hepatitis-B or Hepatitis=B)
    - BYHAND corpus = test-set corpus ≠ AUTOMATIC corpus
- Conclusion
  - We proposed a discriminative orthographic disambiguation method.
  - We also proposed a method for collecting both positive & negative examples.
  - Experimental results yielded high levels of accuracy (87.8%), demonstrating the feasibility of the proposed approach.

Unfortunately Bergsma [ACL2007] proposed similar methods

In the future, we will employ more features to boost the accuracy

P/N*	$Term_1$	$Term_2$
+1	ヨードピラセット (YO O DO PI RA SE TTO; iodopyracet)	ヨードピラセト (YO O DO PI RA SE TO; iodopyracet)
+1	マイクロメーター (MA I KU RO ME E TA A; micrometer)	マイクロメータ (MA I KU RO ME E TA; micrometer)
+1	アンプリファイア (A N PU RI FA I A; amplifier)	アンプリファイヤー (A N PU RI FA I YA A; amplifier)
+1	オシロスコープ (O SI RO SU KO O PU; oscilloscope)	オッシロスコープ (O SSI RO SU KO O PU; oscilloscope)
+1	動コンプライアンス (DO U KO N PU RA I A N SU; dynamic compliance)	動的コンプライアンス (DO U TE KI KO N PU RA I A N SU; dynamic compliance)
+1	浸透圧性ショック (SI N TO O A TU SE I SYO KKU; osmotic shock)	浸透圧ショック (SI N TO O A TU SYO KKU; osmotic shock)
-1	B 型肝炎 (BI I GA TA KA N E N; hepatitis B)	C 型肝炎 (SI I GA TA KA N E N; hepatitis C)
-1	トランス (TO RA N SU; trance)	トランジスタ (TO RA N JI SU TA; transistor)
-1	ビタミン P (BI TA MI N PI I; vitamin P)	ビタミン C (BI TA MI N SI I; vitamin C)
-1	カドミウム (KA DO MI U MU; cadmium)	カルシウム (KA RU SI U MU; calcium)
-1	アルコール (A RU KO O RU; alcohol)	グルコース (GU RU KO O SU; glucose)
-1	メラトニン (ME RA TO NI N; melatonin)	セロトニン (SE RA TO NI N; serotonine)

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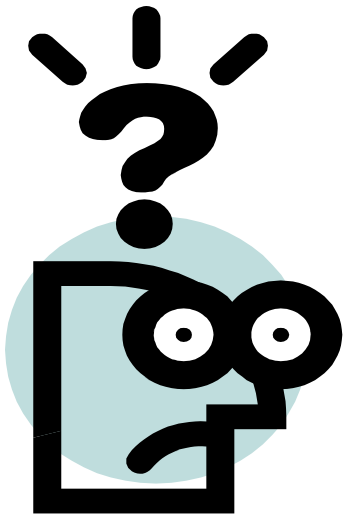

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