The Illinois-Columbia System in the CoNLL-2014 Shared Task on Grammatical Error Correction

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The CoNLL-2014 Shared Task

Nowadays *phone/phones *has/have many functionalities, including *Ø/a camera and a Wi-Fi receiver.

- Extends last year's shared task
- CoNLL-2013 competition – **five error types** (account for about 50% of errors in the CoNLL data)
- CoNLL-2014 evaluates with respect to all errors (28 error types)
- *Our system ranked first on after-revisions data and second on before-revisions data*

System Design and Goals

Build a **robust** system that can make use of
- Cheap linguistic resources
  E.g. native English data
- Available knowledge of the error patterns of specific language learners
  Annotated learner data (training data of the shared task)
- Machine-learning methods
- Inexpensive but reliable linguistic knowledge

Adaptation (Overview)

- Learner errors are systematic
- *Adaptation* refers to developing models that utilize knowledge about typical mistakes
- Different notions of adaptation:
  - Priors method for NB (ACL'11)
  - Artificial errors for AP (NAACL'10)
  - Error inflation (BEA'12)

The Illinois-Columbia System

- Based on the Illinois system that ranked first in the CoNLL-2013 shared task
- Extends the Illinois system in several respects:
  - Targets additional error types
  - Model combination
  - Joint inference to eliminate inconsistent predictions

Implements ideas proposed in our prior work in this area:
Adaptation, i.e. developing models that are aware of error patterns, using scarce annotation): NAACL'10, ACL'11
Algorithmic perspective: ACL'11
Linguistically-inspired approach to correcting open-class errors: EACL'14
Joint inference: EMNLP'13

The Illinois System

- Pre-processing: POS tagging and shallow parsing using the *Illinois POS tagger and chunker*

Error	Training data	Learn. argorithm	Adaptation	Ling. knowledge
Article	Learner	AP	Error inflation (NAACL'10, BEA'12)	Features
Prep.	Native	NB	Priors method (ACL'11)	-
Noun	Native	NB	-	Candidate generation
Verb agr.	Native	NB	-	Candidate generation, separate processing (EACL'14)
Verb form				

Novel Features in the Illinois-Columbia System

- Expanded set of errors
  - Word form errors
  - Mec (punc. and cap.)
  - Style
- Model combination
- Joint inference

Performance of the Illinois-Columbia System on the Development Data

Model		F0.5
The (baseline) Illinois system		*33.17*
+Model combination		34.92-
+Additional errors	Word form	36.07*
	Mec (punc. and cap.)	36.52*
	Style	37.09-
+Joint inference		**37.13**-

Modules marked with a "*" helped on the test data, while those marked with a "-" hurt the performance

New Errors: Word Form

Surveillance technology serves as a warning to the *murders/murderers.

Candidates: which words should be corrected?
Confusion sets: what are the possible alternatives for a given word?
Learning: NB with adaptation trained on native data
See paper for details on other error types

Model Combination

- The Illinois system (2013) trains error-specific components on either learner or native data
- This year, we use model combination:
  - An AP classifier with rich features trained on learner data
  - A NB classifier with word n-gram features trained on native data

Joint Inference

Inconsistent predictions:

They believe that such situation must be avoided.

such situation →
such a situations

Following Rozovskaya&Roth'13, we use **joint inference** implemented on top of individually-learned models using the ILP formulation (Roth&Yih'04)

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