Lexical Normalization for Code-switched Data and its Effect on POS Tagging

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Lexical normalization

social ppl r troublesome

Lexical normalization

social	ppl	r	troublesome
social	people	are	troublesome

Code-switched data

ak . luv u :(till die

@username tamam yinede gute nacht .

Code-switched data

ak	.	luv	u	:(	till	die
aku	.	love	you	:(	till	die

@username	tamam	yinede	gute	nacht	.
@username	Taman	yine de	gute	Nacht	.

Datasets

	#words	%norm	% split	%merge	CMI
Id-En	18,758	14.13	1.33	0.17	28.20
Tr-De	13,217	25.97	3.01	1.04	22.44

Table: Descriptive normalization and code-switching statistics on the training split of the datasets.

Datasets

Turkish-German:

- Based on data from Çetinoğlu and Çöltekin (2016)
- Provide aligned normalization
- Also allign LangID's and POS tags

Previous work

Lexical normalization:

- Rule-based: Barik et al. (2019)
- "Traditional" approaches: MoNoise (van der Goot, 2019), Jin (2015)
- Neural networks: Adouane et al. (2019); Lourentzou et al. (2019); Bhat et al. (2018)
- BERT: Muller et al. (2019)

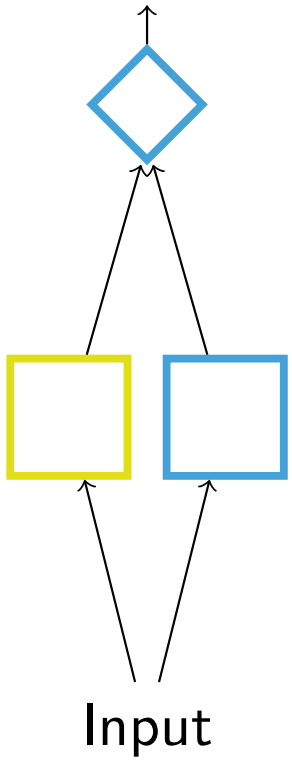
Previous work

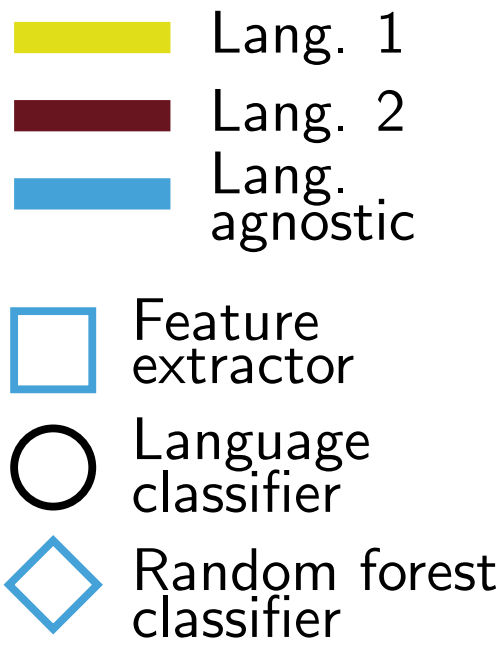
We use MoNoise:

- SOTA for many languages
- Especially powerful in low-resource scenario's
- Open-source

Previous work

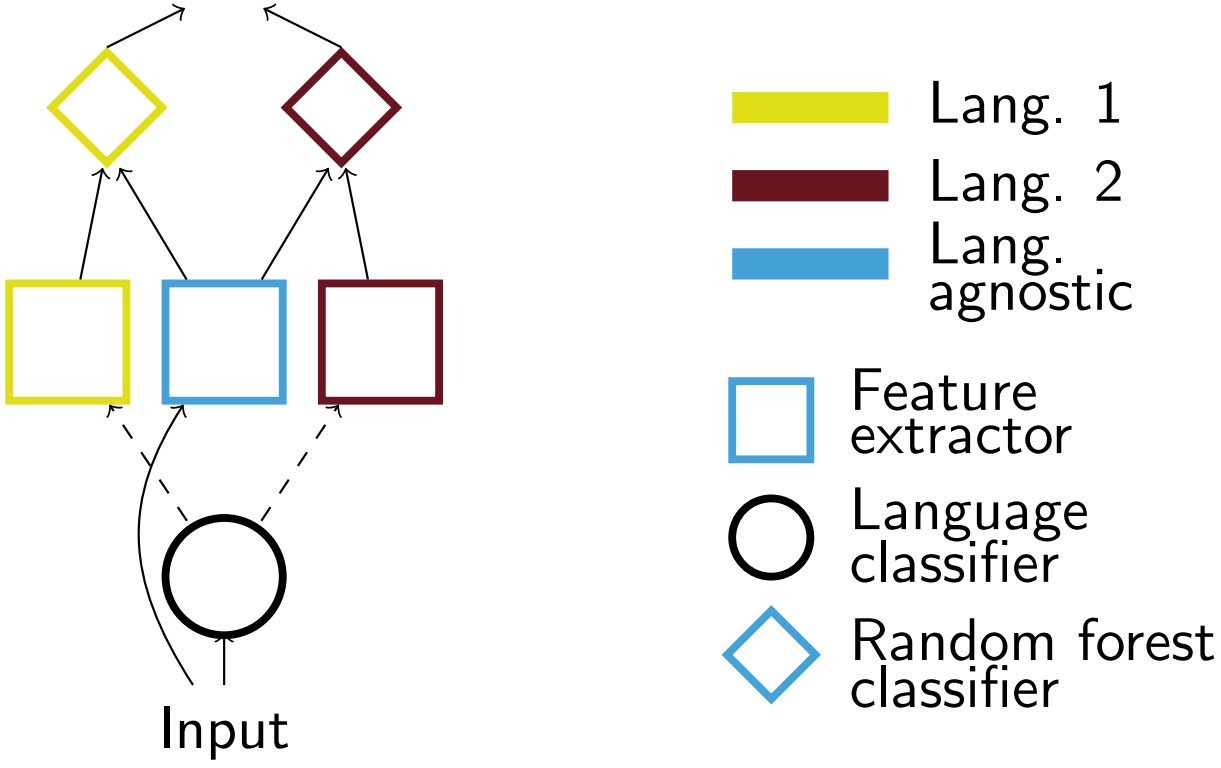
MoNoise:





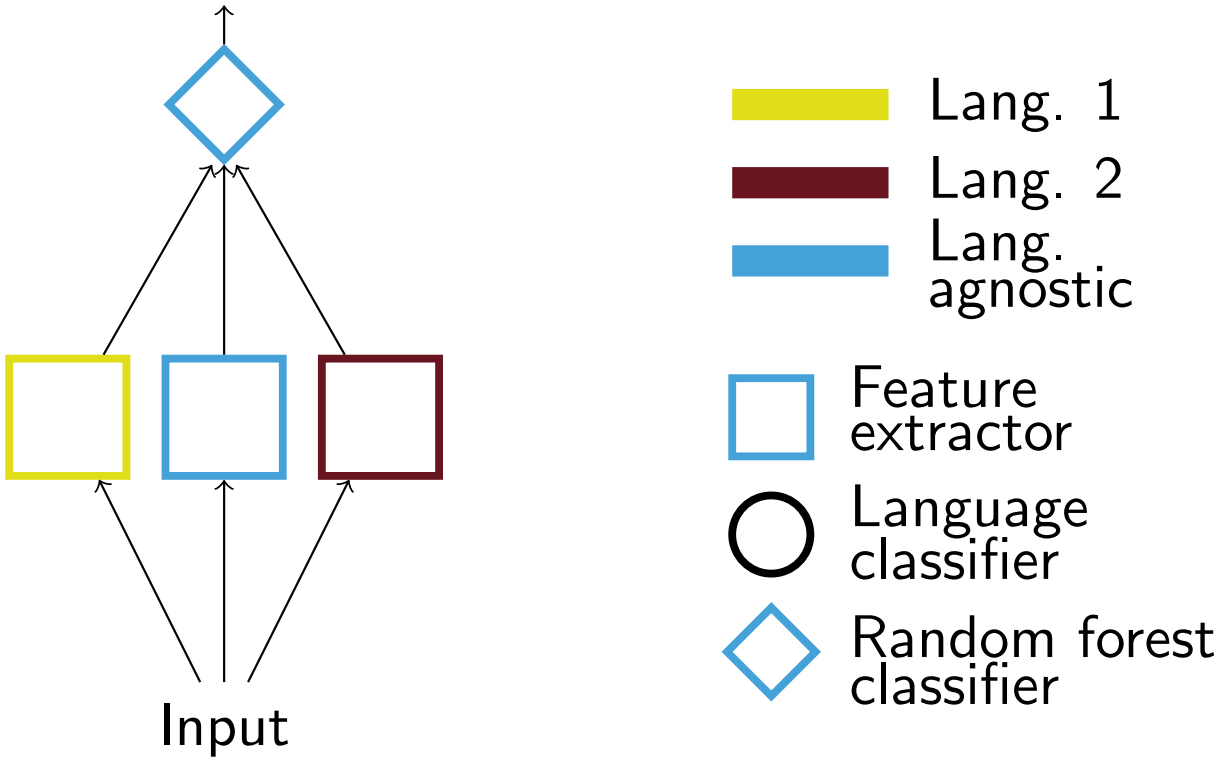
Models

Fragment-based MoNoise:



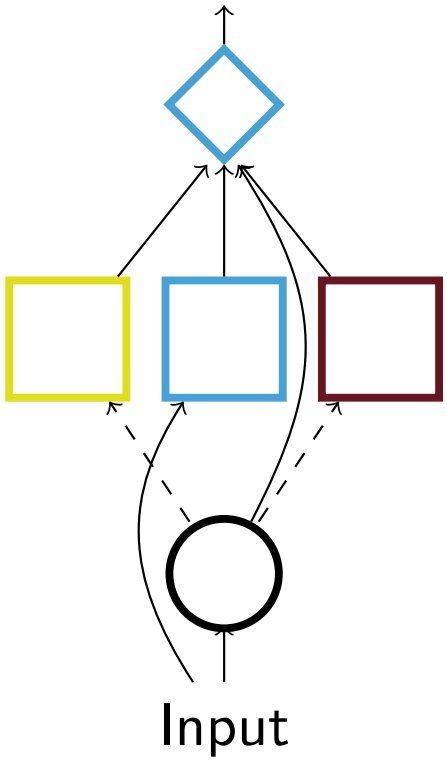
Models

Multilingual MoNoise:



Models

Language-aware MoNoise:



Results

Baselines:

- Leave-As-Is (LAI): return input
- Most-Frequent-Replacement (MFR): return the most frequent normalization for each word learned from training data

Results

Metric: accuracy

Results

Model	Id-En	Tr-De
LAI	73.24	74.03
MFR	*88.35	*78.57
Monolingual-lang1 (Tr/Id)	*94.76	*79.81
Monolingual-lang2 (De/En)	*94.31	80.58
Fragments	94.73	*81.24
Multilingual	94.84	*81.74
Language-aware	94.79	81.68

Table: Normalization performance of the baselines and the proposed models (10-fold accuracy). * Statistical significant.

Results

POS tagging:

- MaChAmp (van der Goot et al., 2021), trained on UD_German-GSD and UD_Turkish-IMST
- Comparison of no normalization, all our models and gold normalization

Results

Model	Tr-De
LAI	60.77
Monolingual (Id/De)	*63.47
Multilingual	*64.06
Language-aware	*63.92
Gold	*67.75

Table: POS tagging accuracies.

Results

Analysis:

- More increase in precision
- LangID performance matters
- More gains on German/English
- Qualitative analysis
- POS confusion matrices

Results

Thanks!

- Code: https://bitbucket.org/robvanderg/csmonoise
- Data: https://github.com/ozlemcek/TrDeNormData

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