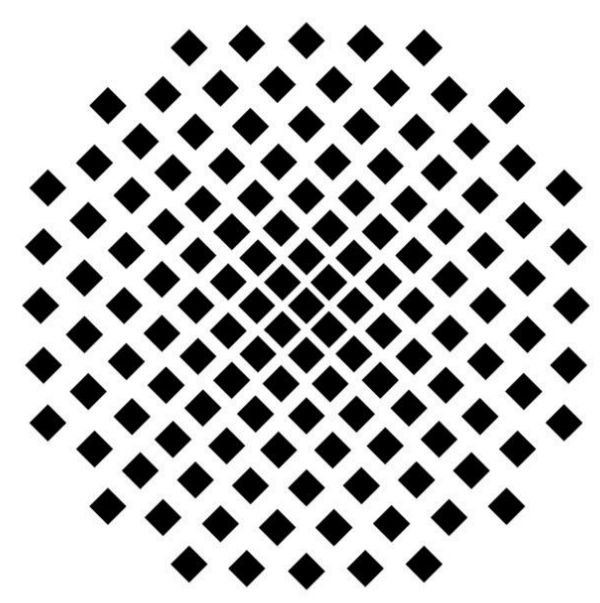


# The IMS–CUBoulder System for the SIGMORPHON 2020 Shared Task on Unsupervised Morphological Paradigm Completion



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## The task

The unsupervised morphological paradigm completion task aims at generating inflections – more specifically all inflected forms, i.e., the entire paradigms, of given lemmas – without any explicit morphological information during training.

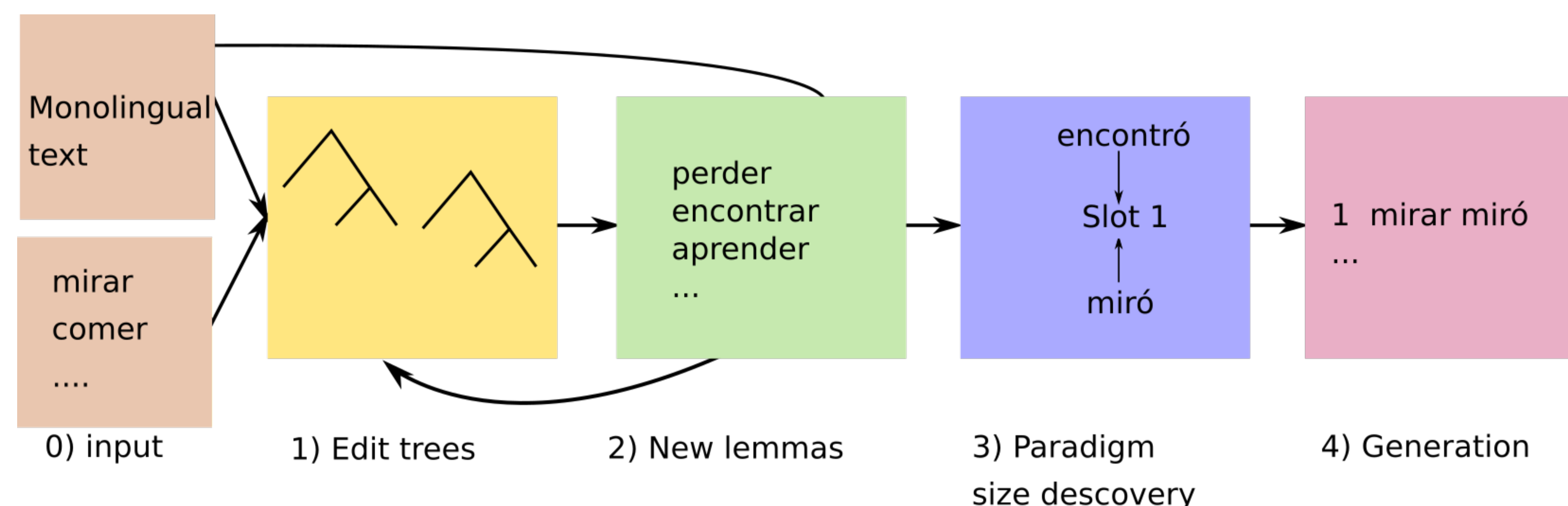
## The task

acomodar	acomodar	acomodadas	1
	acomodar	acomodada	2
	acomodar	acomodados	3
	acomodar	acomodado	4
	...	....	..
descobrir	descobrir	descobertas	1
	descobrir	descoberta	2
	descobrir	descobertos	3
	descobrir	descoberto	4
	...	...	..
orientar	orientar	orientadas	1
	orientar	orientada	2
	orientar	orientados	3
	orientar	orientado	4
	...	...	..

## Our systems

We submit two systems, which are both modifications of the official shared task baseline. In particular, we substitute the baseline's generation component.

## Baseline pipeline



## Our two submissions

We use an LSTM encoder-decoder model with attention (Bahdanau et al., 2015) for our first system, IMS–CUB1. In our second system, IMS–CUB2, the generation component is a pointer-generator network (See et al., 2017), motivated by the pointer-generator's better performance on morphological inflection in the low-resource setting.

## Shared task results

Language	BL		KU–CST		IMS–CUB		NYU–CUB		
	1	2	1	2	1	2	1	2	3
Basque	0.06	0.06	0.02	0.01	0.04	00.06	0.05	0.05	<b>0.07</b>
Bulgarian	28.30	31.69	2.99	4.15	27.22	<b>32.11</b>	27.69	28.94	27.89
English	65.60	<b>66.20</b>	3.53	17.29	47.80	<b>61.00</b>	50.20	52.80	51.20
Finnish	05.33	<b>5.50</b>	0.39	2.08	04.90	<b>05.38</b>	5.36	5.47	05.35
German	28.35	<b>29.00</b>	0.70	4.98	24.60	<b>28.35</b>	27.30	27.35	27.35
Kannada	15.49	15.12	4.27	1.69	10.50	<b>15.65</b>	11.10	11.16	11.10
Navajo	3.23	<b>3.27</b>	0.13	0.20	0.33	<b>01.17</b>	0.40	0.43	0.43
Spanish	22.96	<b>23.67</b>	3.52	10.84	19.50	<b>22.34</b>	20.39	20.56	20.30
Turkish	14.21	<b>15.53</b>	0.11	0.71	13.54	14.73	14.88	<b>15.39</b>	15.13
Average	20.39	<b>21.12</b>	1.74	04.66	16.49	<b>20.09</b>	17.49	18.02	17.65

Table 1: Final macro-average BMAcc in percentages results.

## System selection

For IMS–CUB2, we select the best performing system (between two hyperparameter setups). The models are evaluated on the morphological inflection task development set using accuracy.

## Findings

Our findings are as follows:

- the copy capabilities of a pointer-generator network are useful in this setup,
- IMS–CUB2 is the best performing one of all submitted systems, and
- unsupervised morphological paradigm completion is a challenging task: no submitted system outperforms the baselines.

## Acknowledgements

This project has benefited from financial support to MM by DAAD via a Doctoral Research Grant.

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