Master thesis

The effects of word segmentation quality on word alignments

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Motivation

- Improvement of alignment quality with different segmentations
- Implementation of **chaos mode**: segmentations without word boundaries
- Show that BPE-dropout improves BPE baseline in many language pairs

Plan

Part 1: BPE pipeline

Part 2: Improvements

- learn-BPE algorithm
- Chaos mode

Part 3: Results

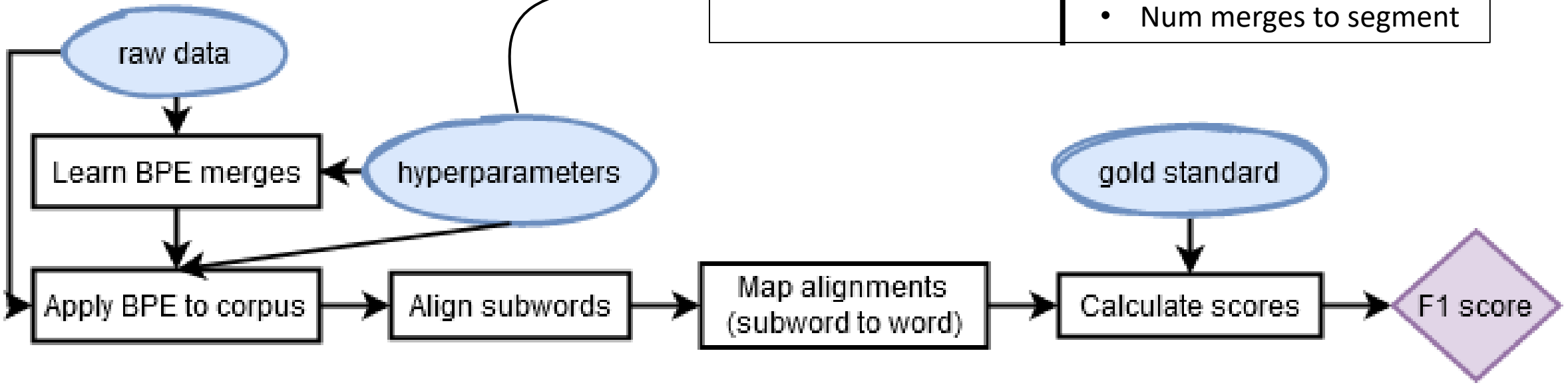
Part 4: Conclusion

1. BPE pipeline

English sentence after 4000 merges:
_they _will _certain ly _en h ance _the _feeling _of _the _right _of _mo vement

- Languages
- Alignment algorithm

- Dropout rate
- Num merges to learn
- Num merges to segment



Plan

Part 1: BPE pipeline

Part 2: Improvements

- learn-BPE algorithm
- Chaos mode

Part 3: Results

Part 4: Conclusion

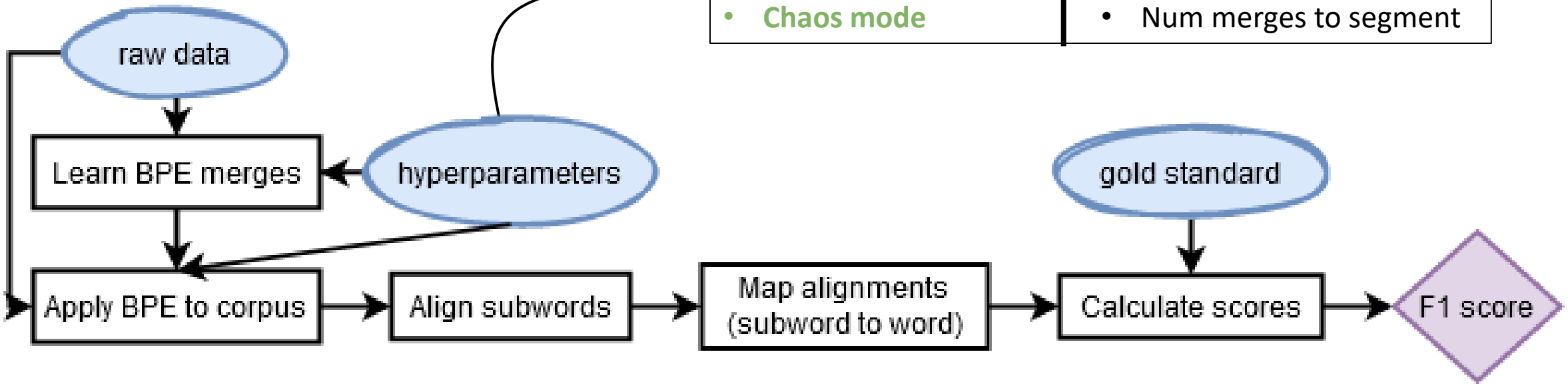
2. Improvements

Chaos mode: segmentations without word boundaries

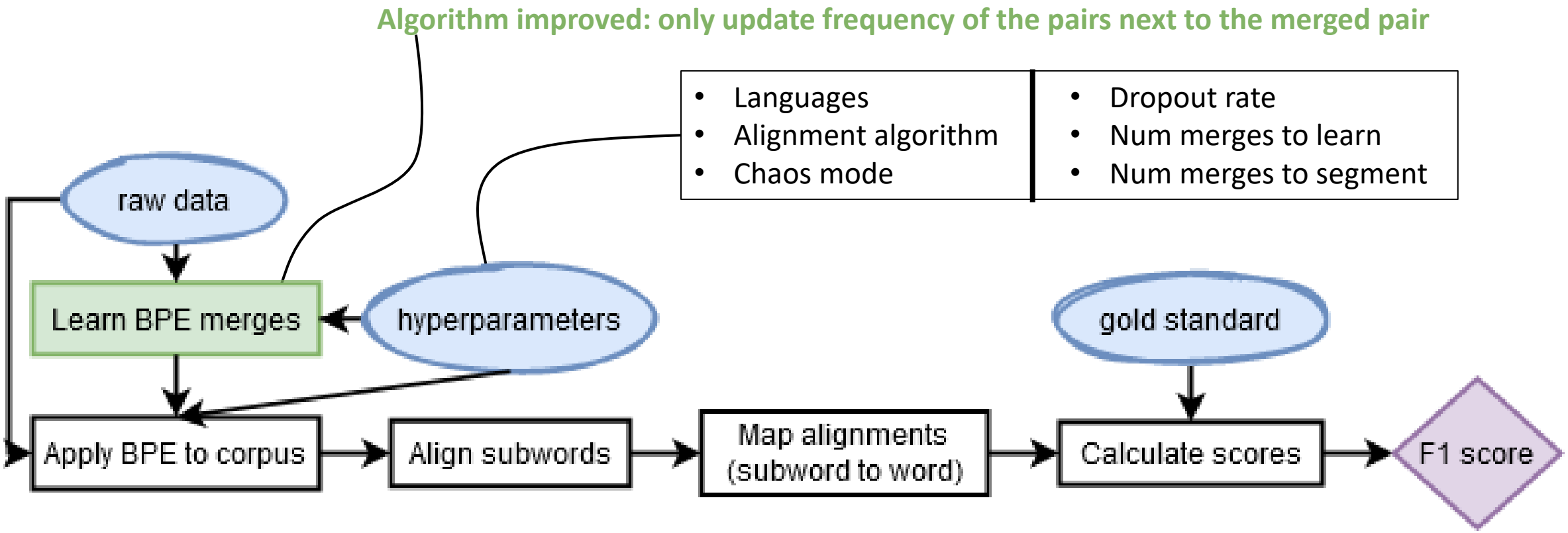
English sentence after 500 merges (chaos mode):
_they_will _cert ain ly _en h ance _the _feel ing_of_the _ri ght_of _mo vement

- Languages
- Alignment algorithm
- **Chaos mode**

- Dropout rate
- Num merges to learn
- Num merges to segment



2. Improvements



Plan

Part 1: BPE pipeline

Part 2: Improvements

- learn-BPE algorithm
- Chaos mode

Part 3: Results

Part 4: Conclusion

3. Results

- **Space mode**: segmentations with word boundary
- **Chaos mode**: segmentations without word boundary

Best hyperparameters

Dropout rate		Num units to segment		Alignment threshold	
Space	Chaos	Space	Chaos	Space	Chaos
10%	20%	2000	200-500	70%	50%

- Improvement of learn-BPE algorithm: speedup by 2.5x for space mode, optimized implementation for chaos mode

3. Results

- **Space mode**: segmentations with word boundary
- **Chaos mode**: segmentations without word boundary

Best hyperparameters

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Baseline BPE results

Eng – Deu (10k sentences)		Eng – Ron (50k sentences)		Eng – Hin (3k sentences)	
Space	Chaos	Space	Chaos	Space	Chaos
F1: 0.609	F1: 0.477	F1: 0.55	F1: 0.538	F1: 0.381	F1: 0.288

Improvements of BPE-dropout vs. BPE

Eng – Deu		Eng – Ron		Eng – Hin	
Space	Chaos	Space	Chaos	Space	Chaos
F1: 0.635	F1: 0.559	F1: 0.564	**F1: 0.58**	F1: 0.396	F1: 0.32

5. Conclusion

- BPE + word alignment pipeline
- Improvement of BPE-dropout over BPE in 3 language pairs, also in chaos mode
- Improvement of learn-BPE algorithm
- Improvement of alignment quality
- Implementation of chaos mode in the pipeline

Current work

- Experiments with different hyperparameters:
  - word level / BPE
  - space / chaos mode
  - no dropout / dropout
- Experiments with scoring instead of dropout

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