Applying the Seed-and-Extend Strategy to Text-Alignment

Master's Defense

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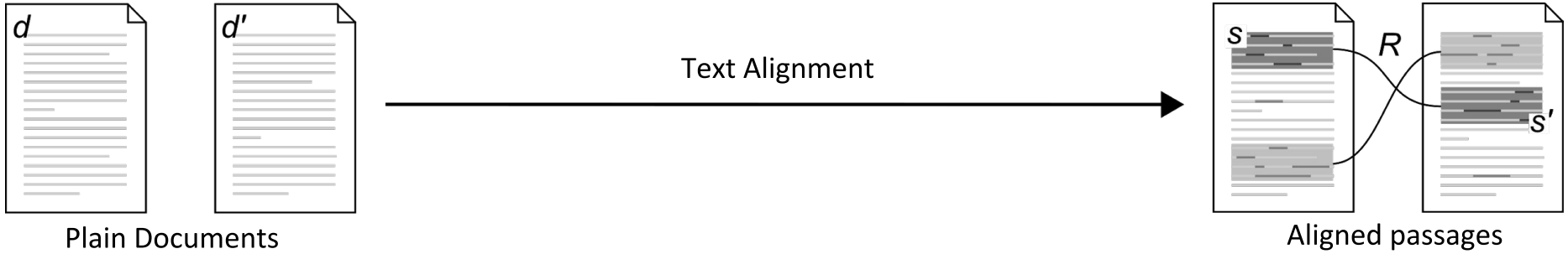
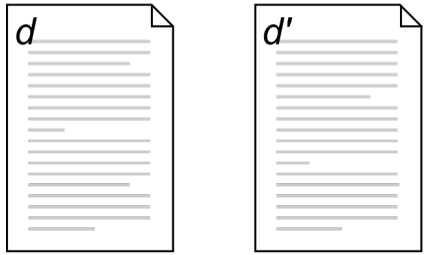
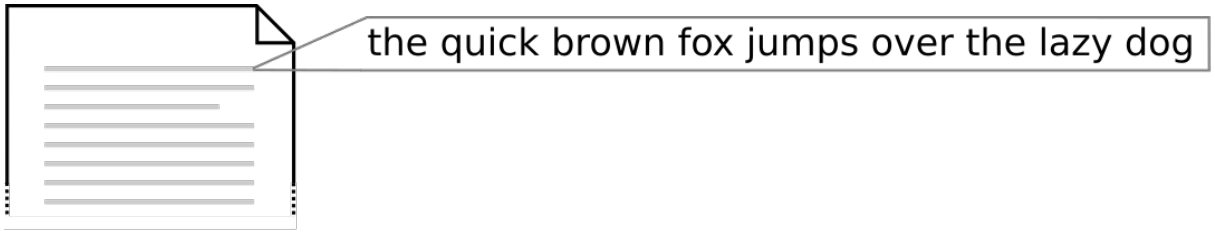
What is Text-Alignment?



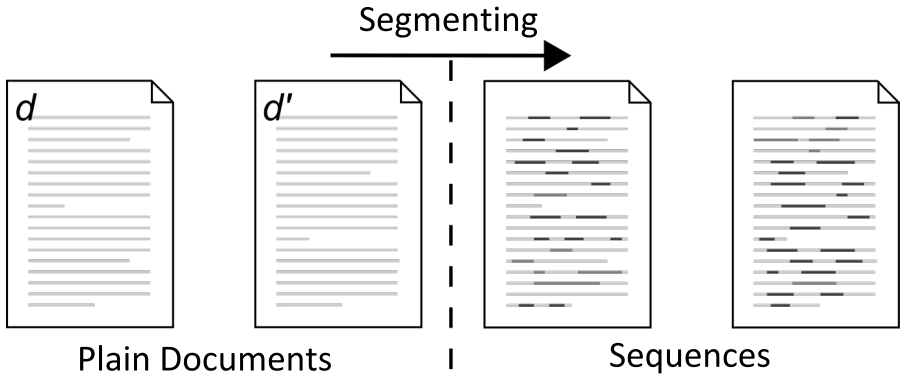
What is Seed-and-Extend?

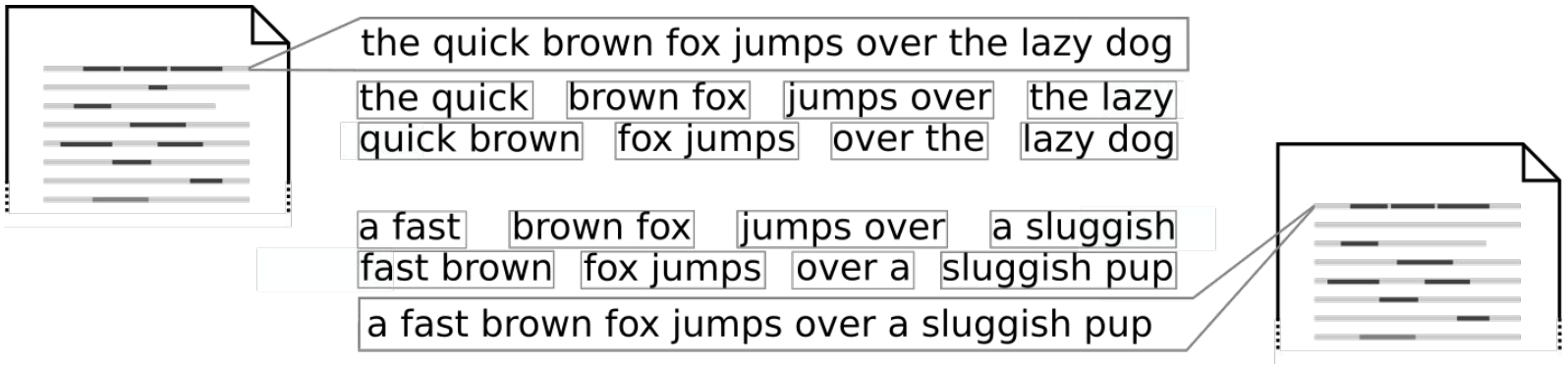


Plain Documents

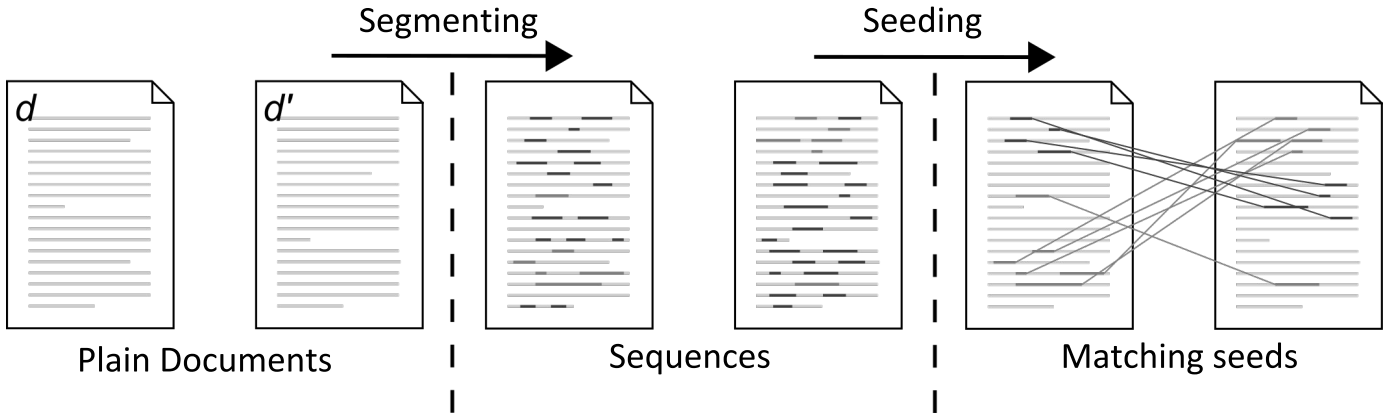


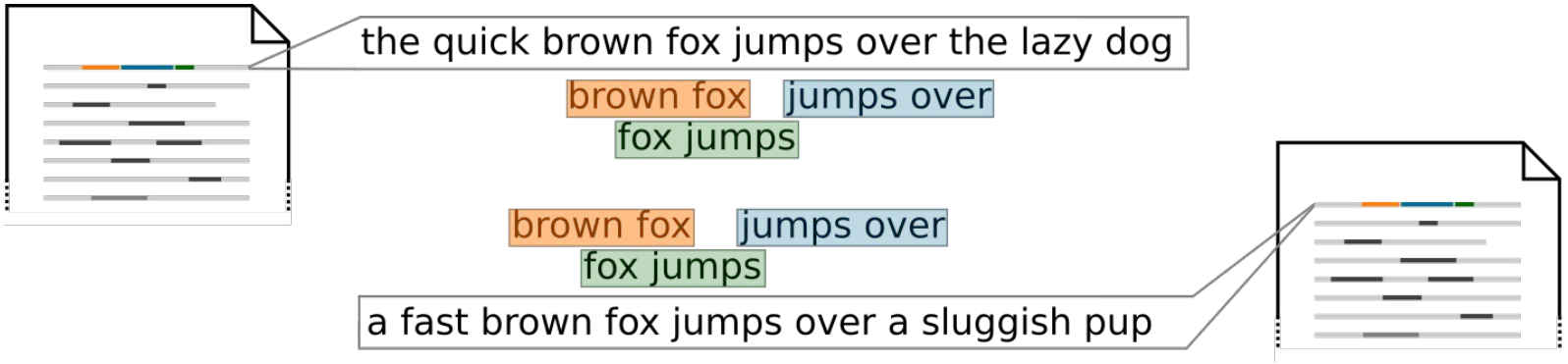
What is Seed-and-Extend?



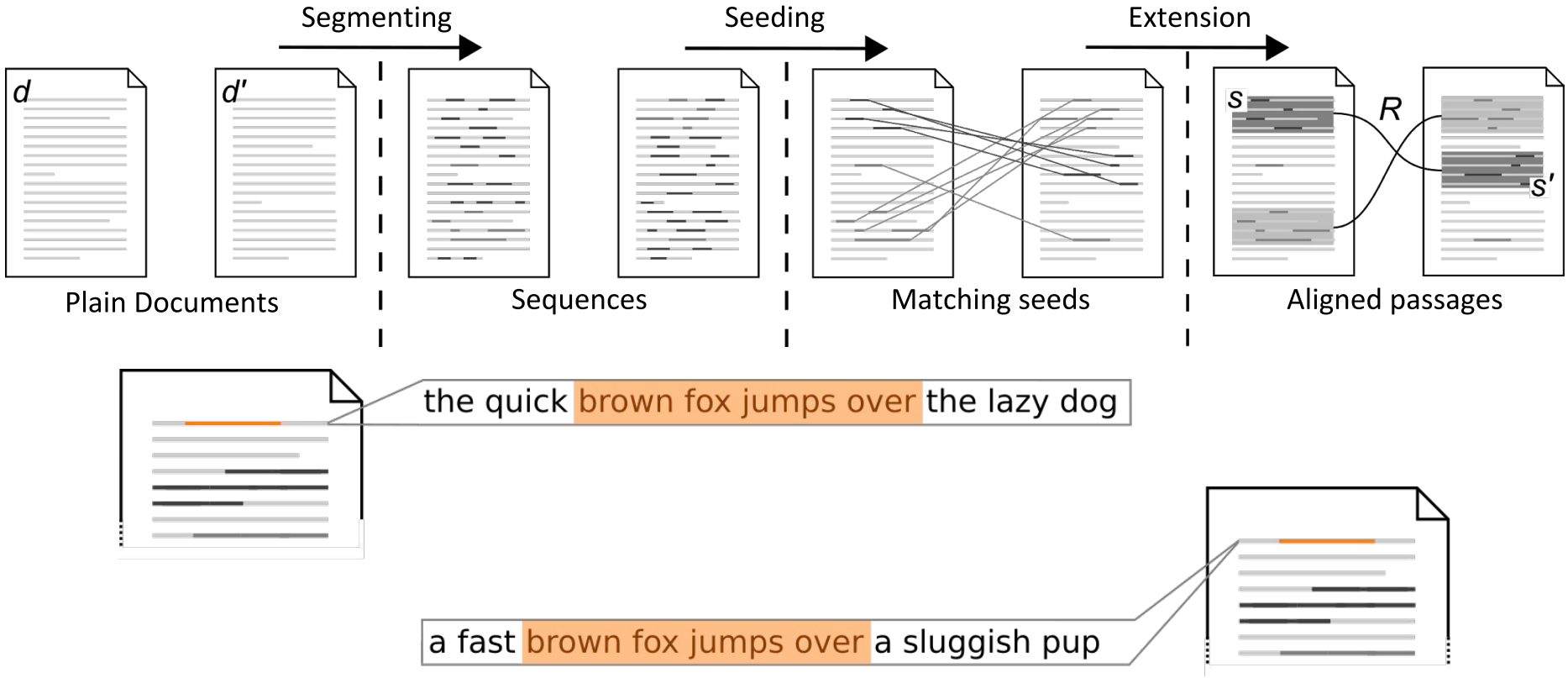


What is Seed-and-Extend?

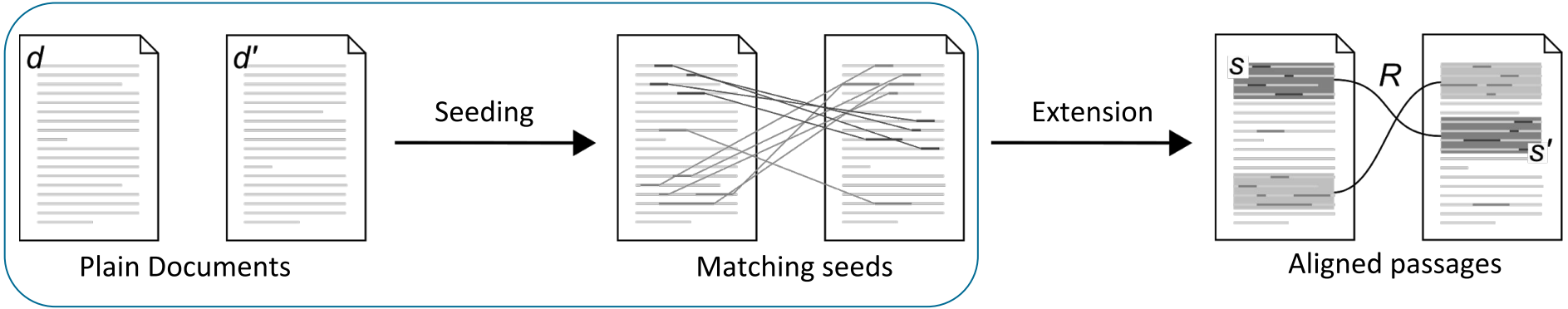




What is Seed-and-Extend?

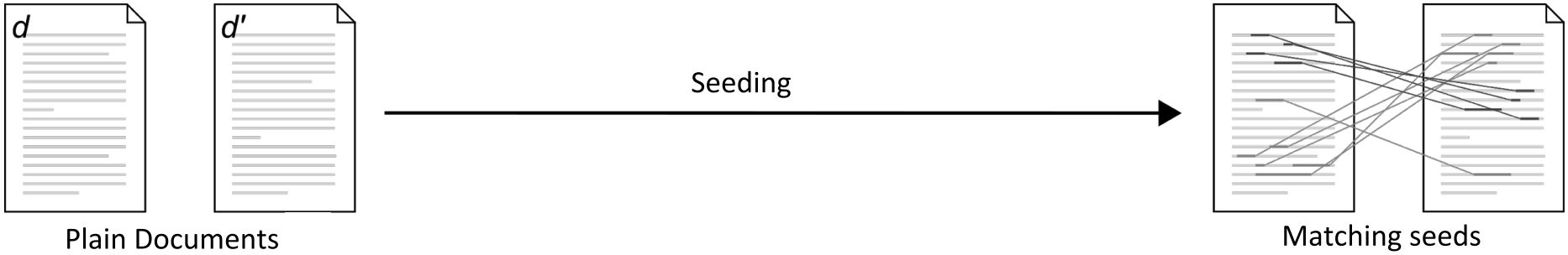


Contributions

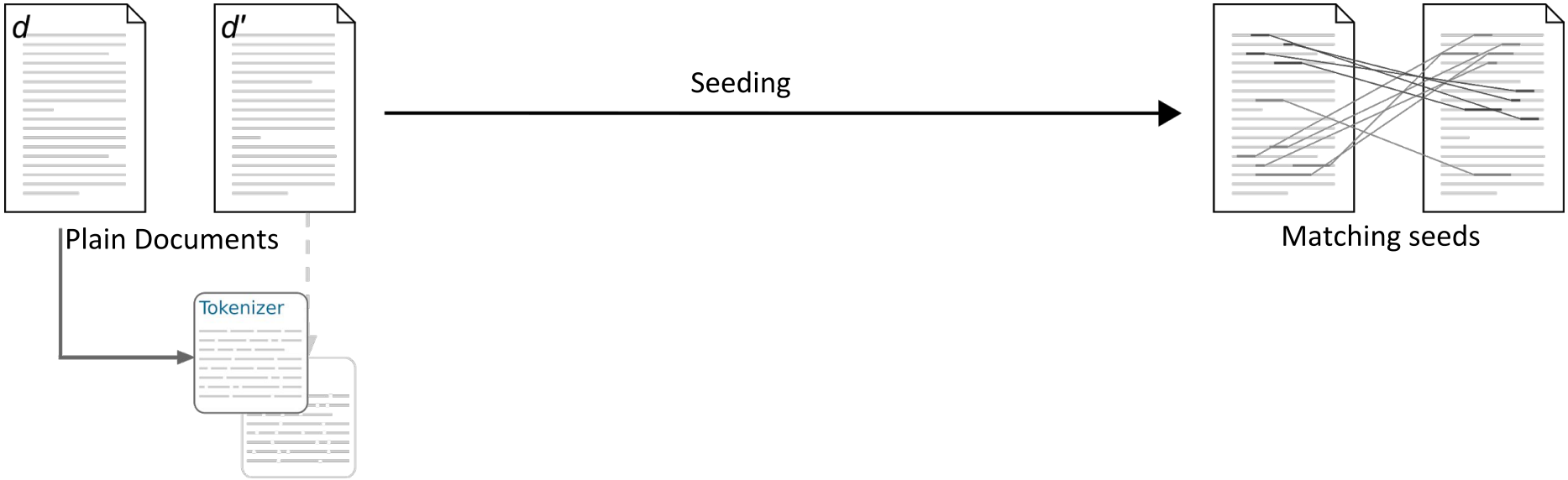


- Model of seeding
- Seeder combination
- Relaxation
- Model of extension
- Parameter estimation

Model of Seeding

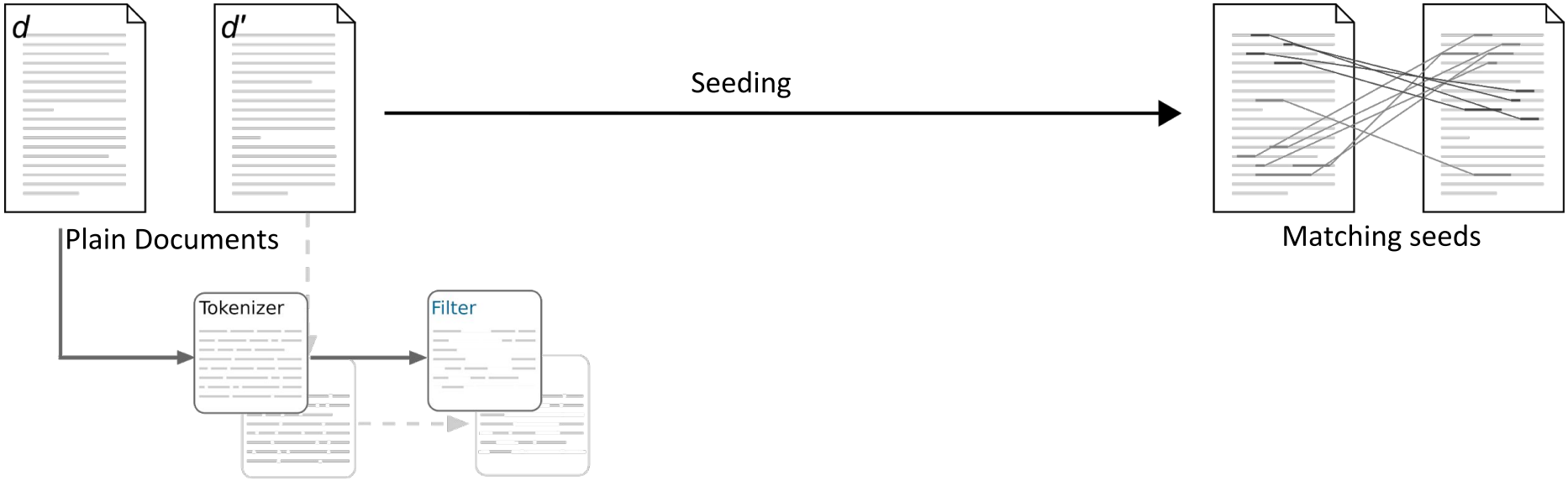


Model of Seeding



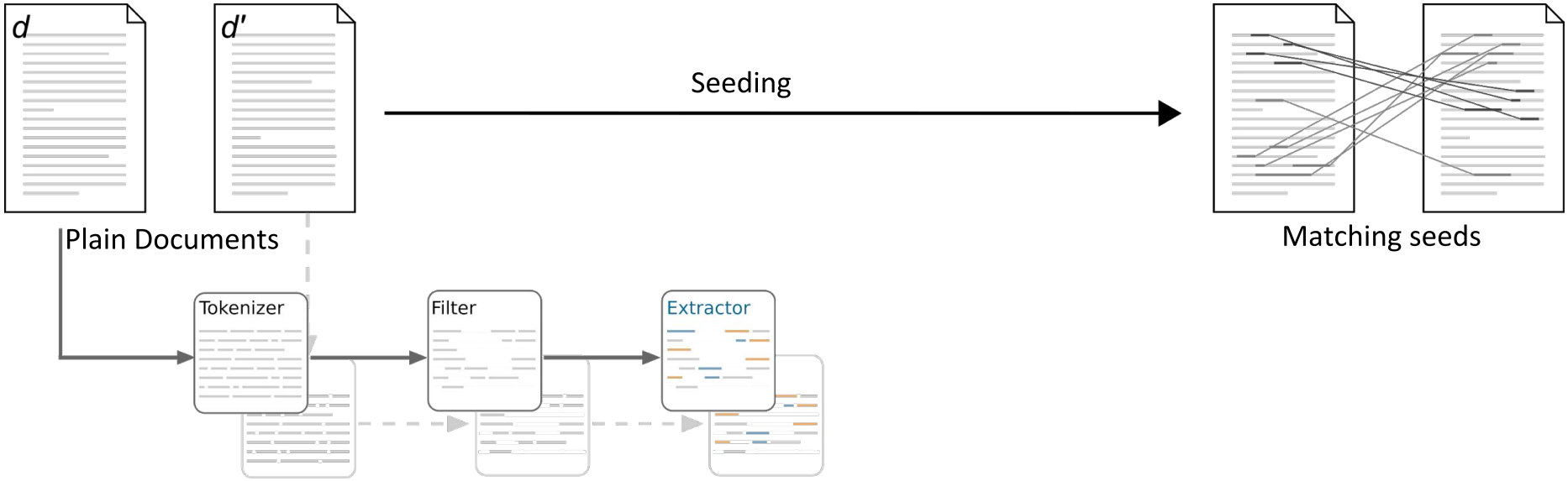
- i.e. whitespace tokenizer, sentence or paragraph splitter

Model of Seeding



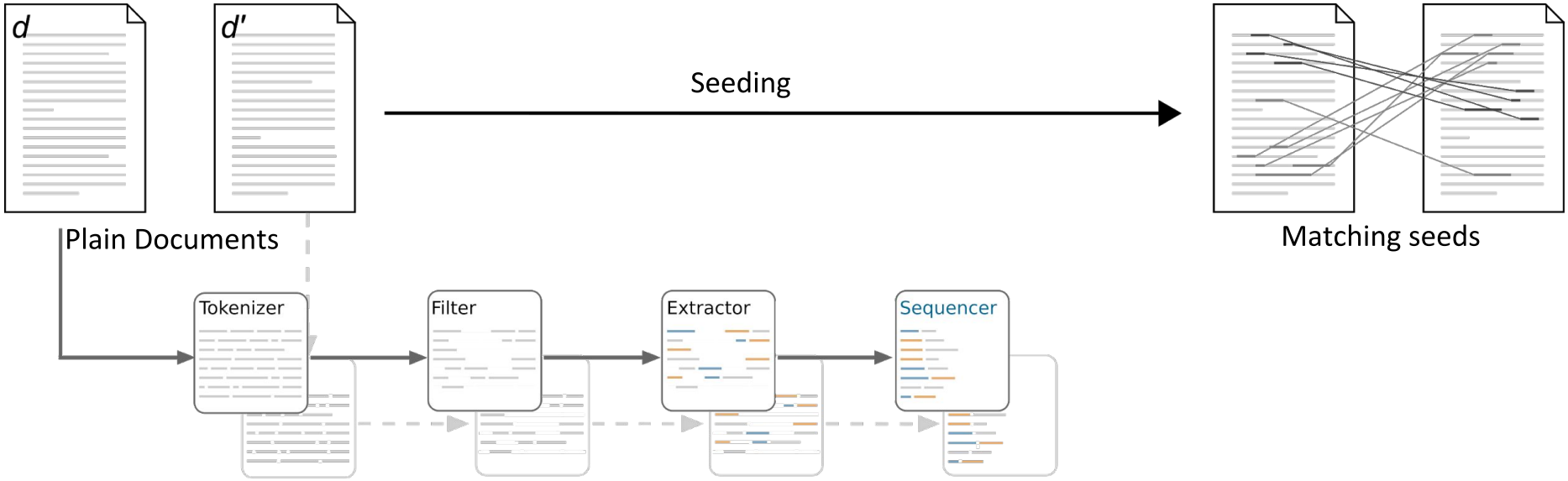
- i.e. wordlist filter, POS-tag filter

Model of Seeding



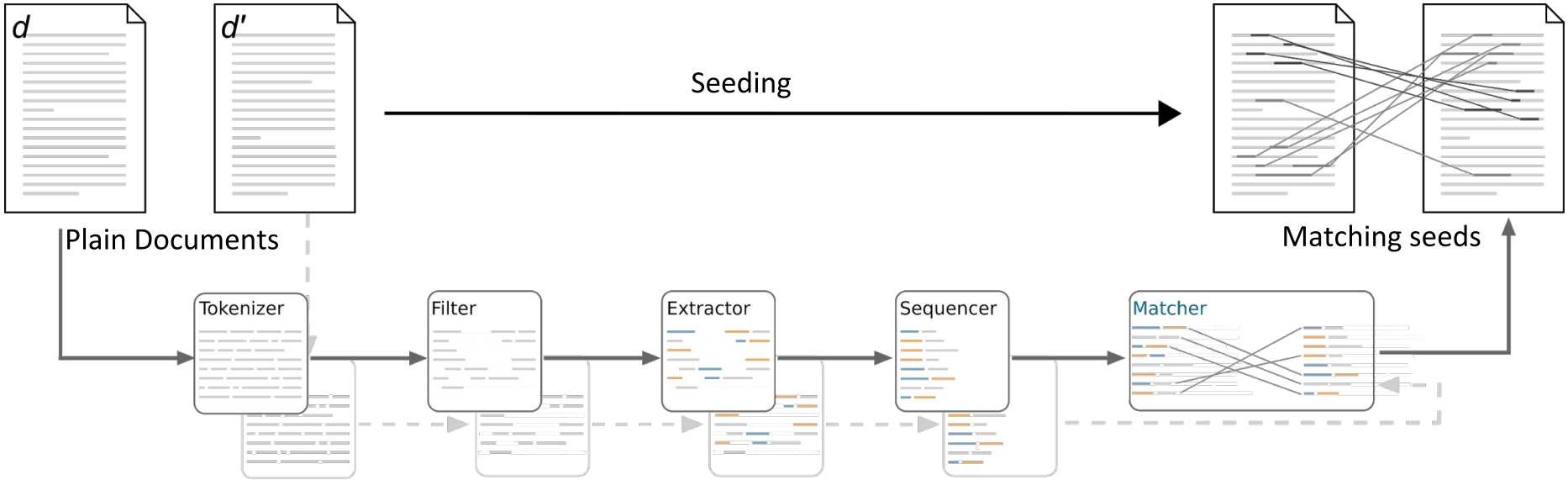
- i.e. plaintext, hypernyms, frequency or word vectors

Model of Seeding



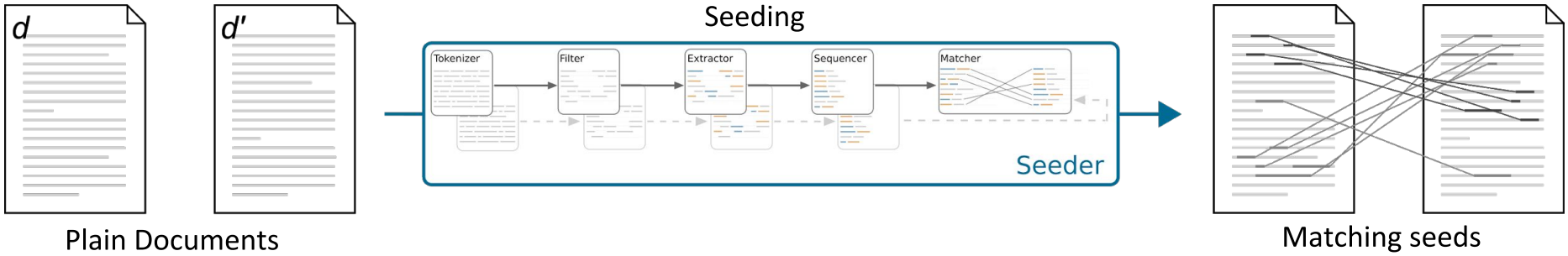
- i.e. n-grams or skip-grams

Model of Seeding

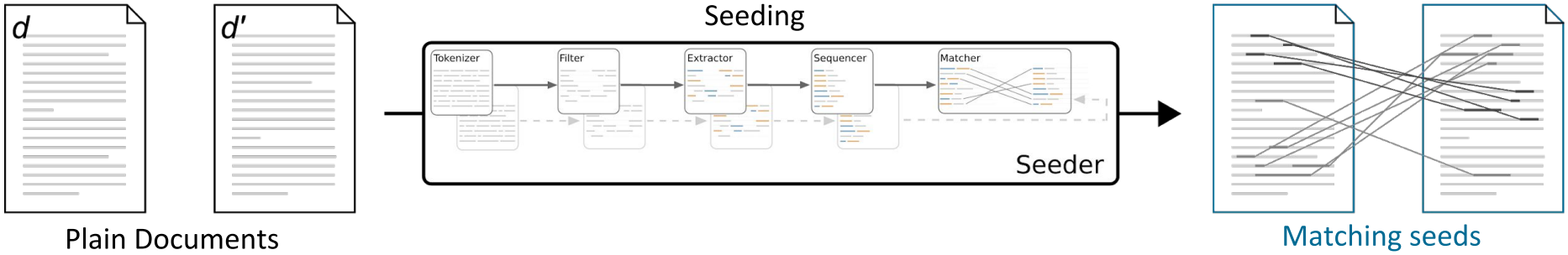


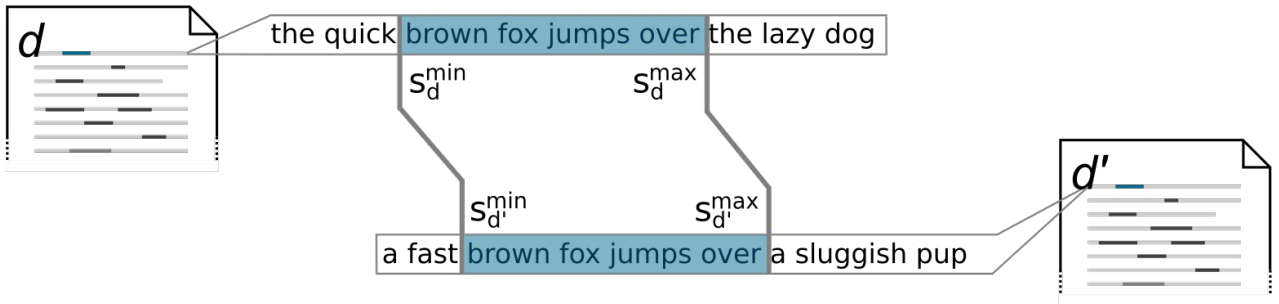
- i.e. exact or set match, Jaccard or cosine similarity

Model of Seeding

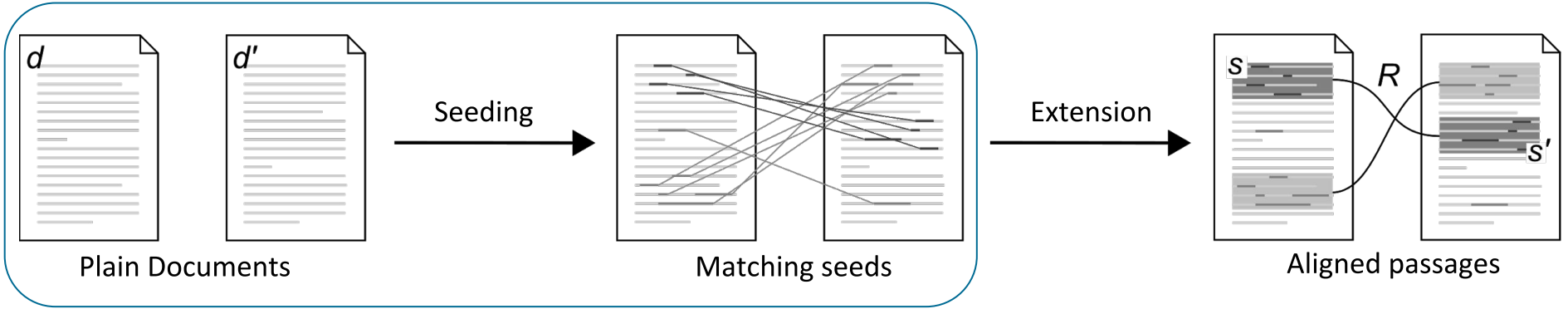


Model of Seeding



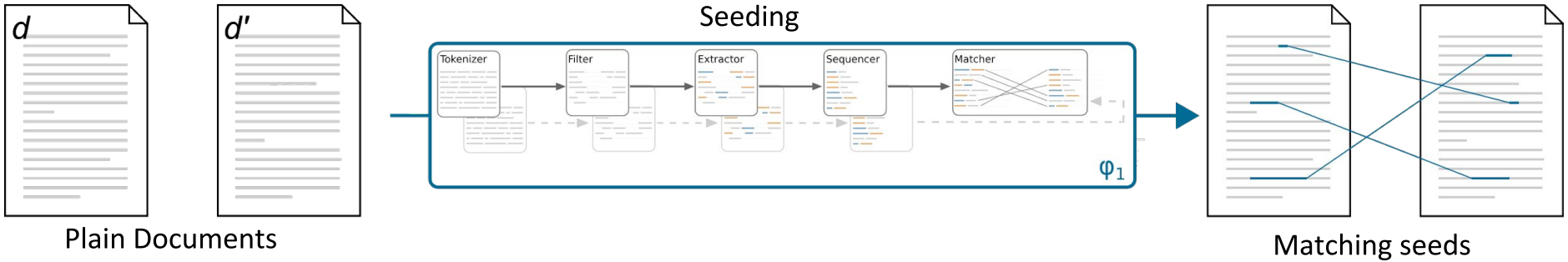


Contributions

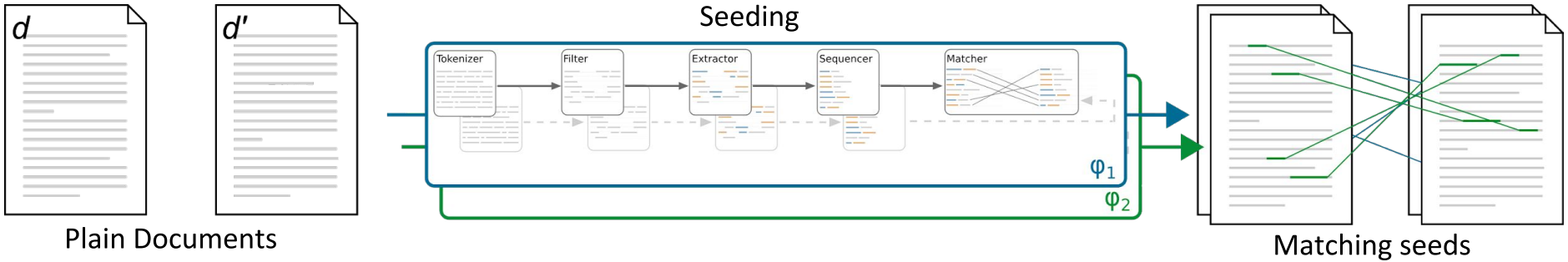


- Model of seeding
- Seeder combination
- Relaxation
- Model of extension
- Parameter estimation

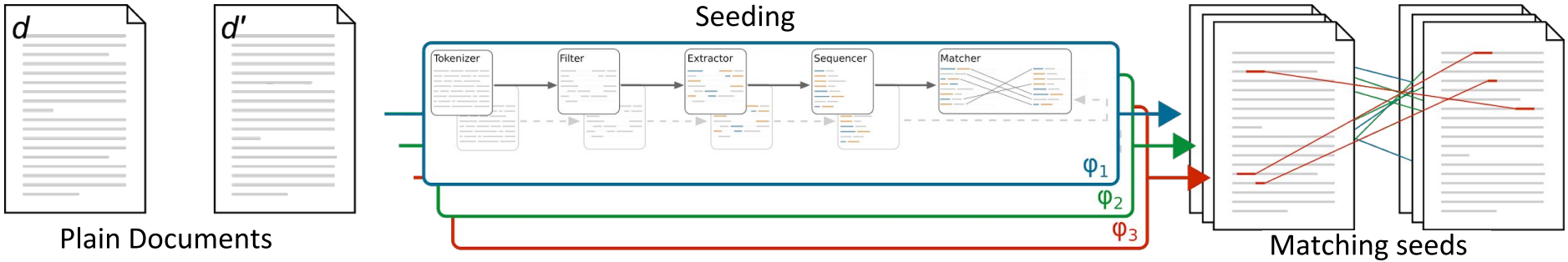
Seeder combination



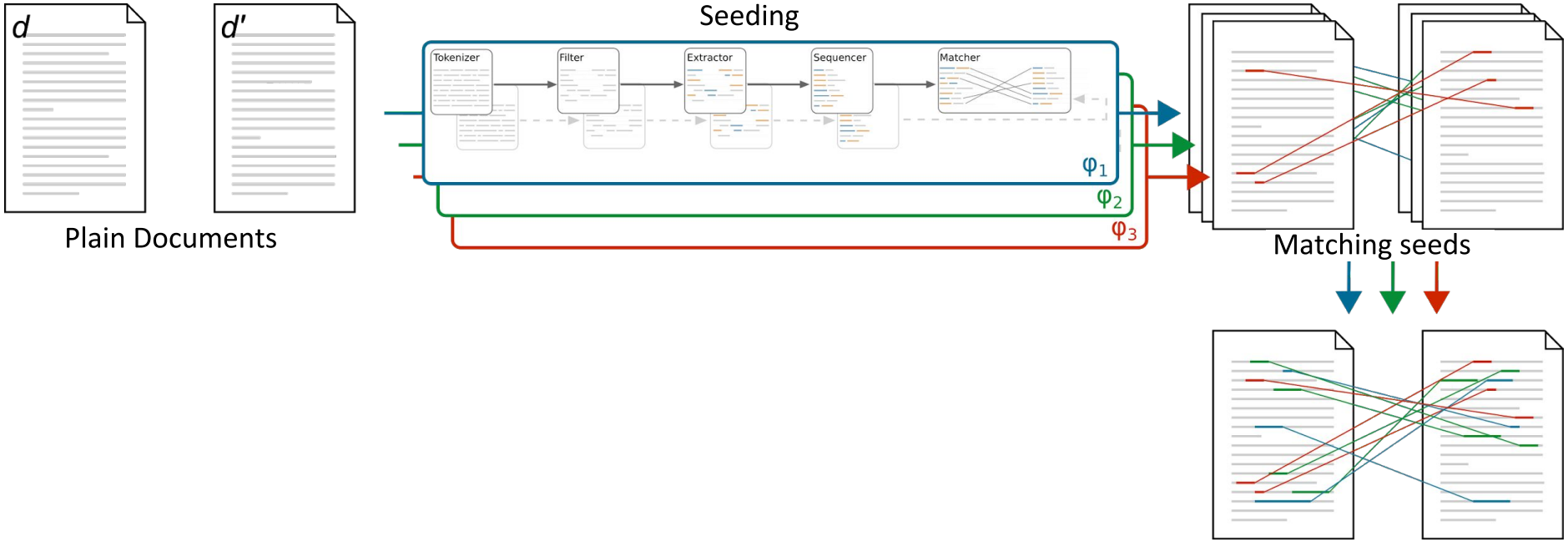
Seeder combination



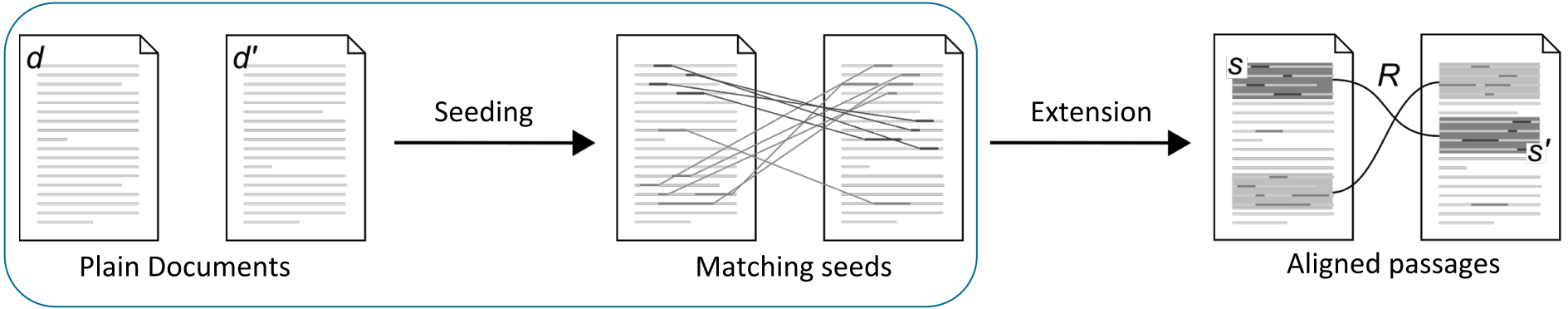
Seeder combination



Seeder combination



Contributions



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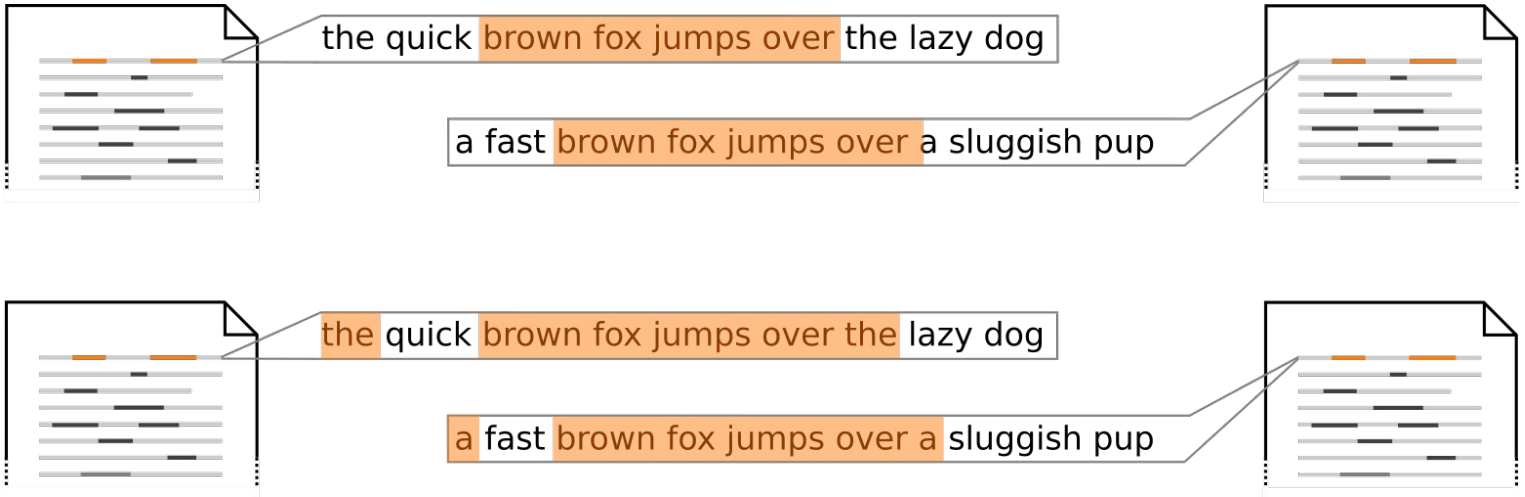
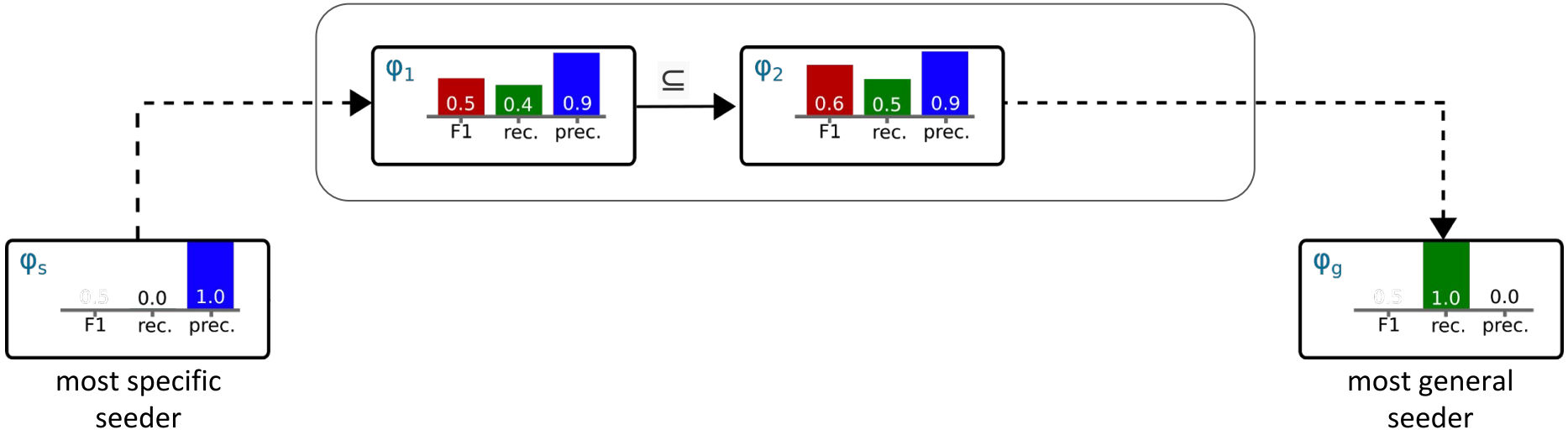
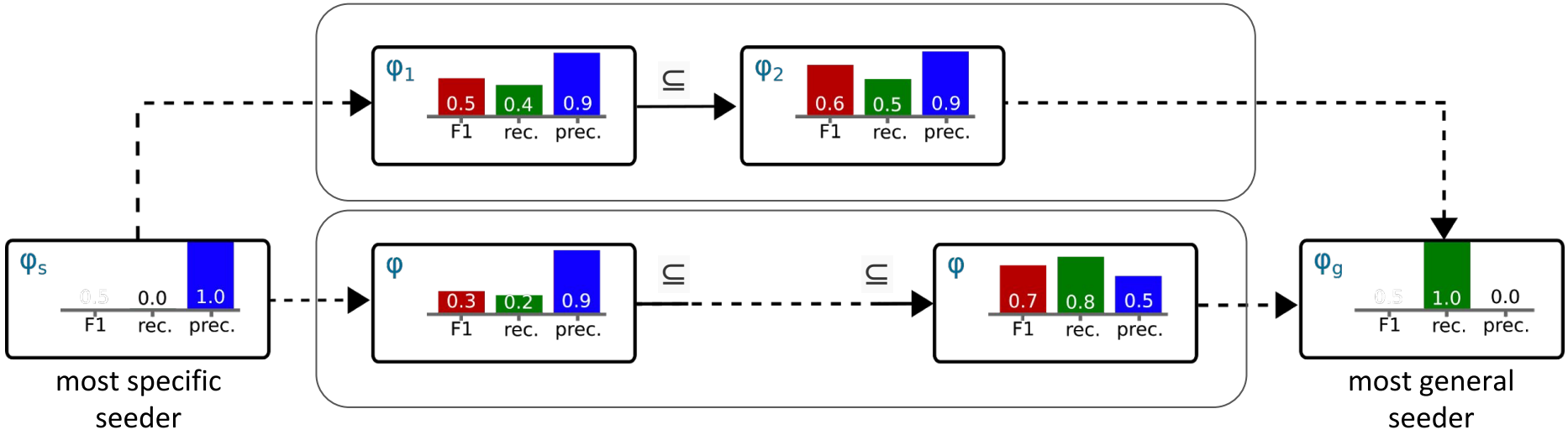
Relaxation


the quick brown fox jumps over the lazy dog
a fast brown fox jumps over a sluggish pup
the quick brown fox jumps over the lazy dog
a fast brown fox jumps over a sluggish pup

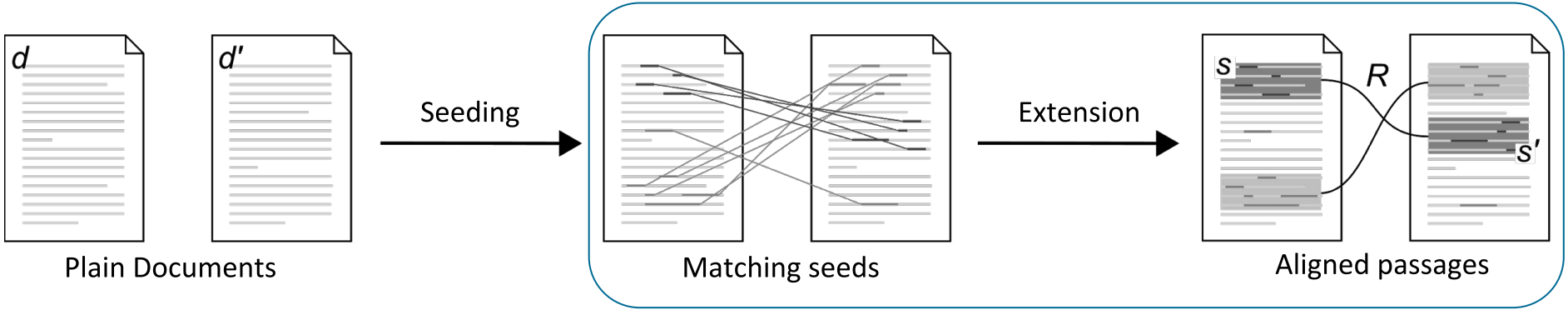
Relaxation


φ1
0.5
0.4
0.9
F1
rec.
prec.
⊆
φ2
0.6
0.5
0.9
F1
rec.
prec.
φs
0.5
0.0
1.0
F1
rec.
prec.
most specific seeder
φg
0.5
1.0
0.0
F1
rec.
prec.
most general seeder

Relaxation


φ1
0.5
0.4
0.9
F1
rec.
prec.
⊆
φ2
0.6
0.5
0.9
F1
rec.
prec.
φs
0.5
0.0
1.0
F1
rec.
prec.
most specific seeder
φ
0.3
0.2
0.9
F1
rec.
prec.
⊆
⊆
φ
0.7
0.8
0.5
F1
rec.
prec.
φg
0.5
1.0
0.0
F1
rec.
prec.
most general seeder

Contributions



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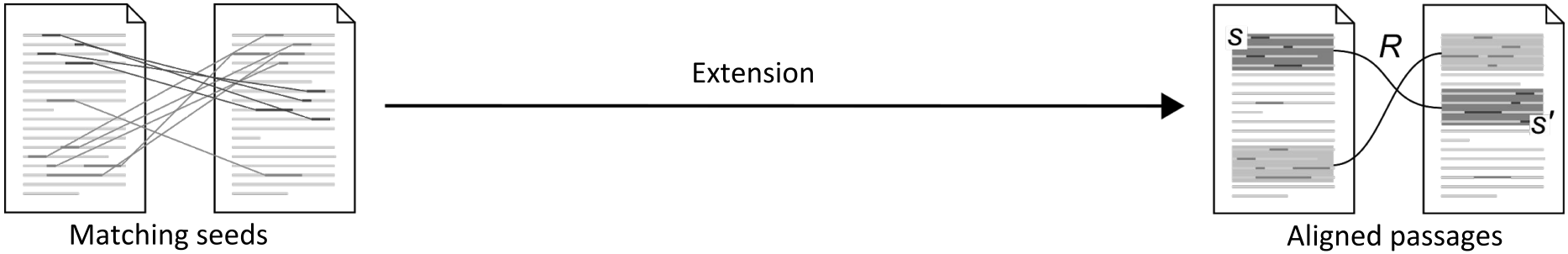
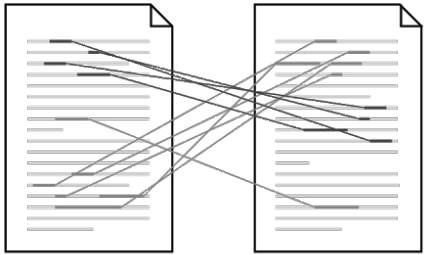
Model of Extension



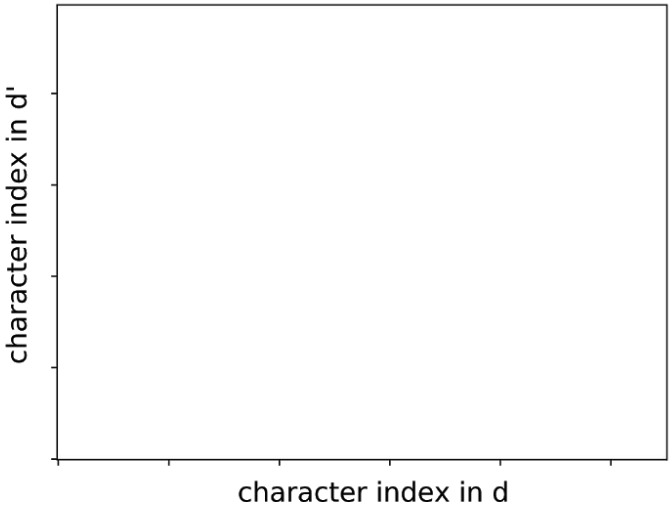
Model of Extension



Matching seeds

Extension

Aligned passages



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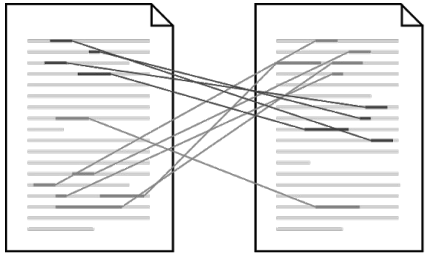
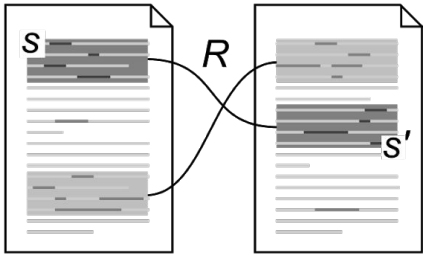
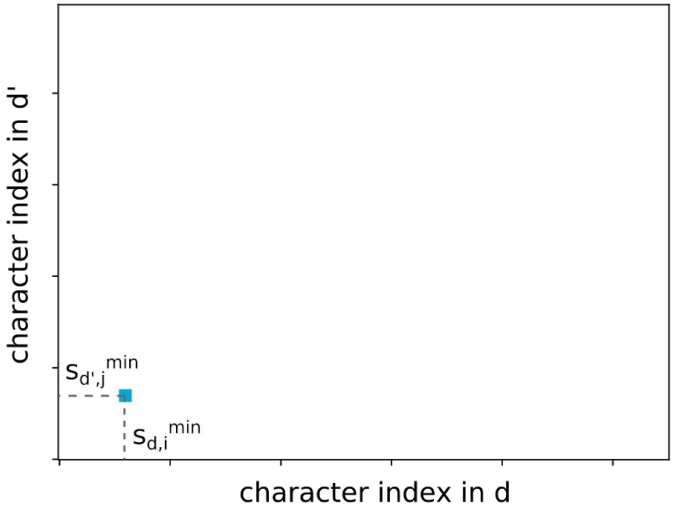


Matching seeds

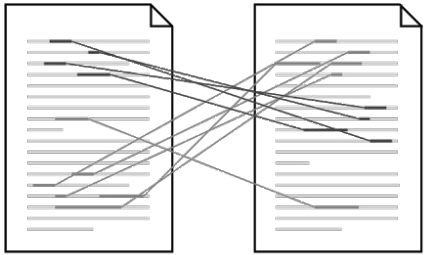
Extension



Aligned passages



Model of Extension



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Extension

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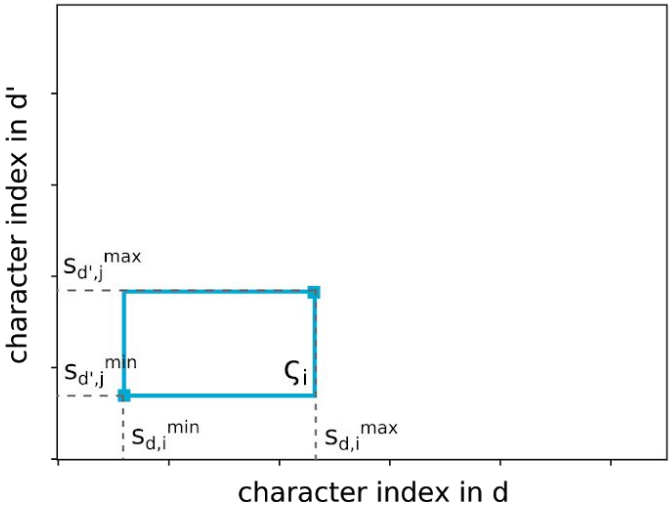

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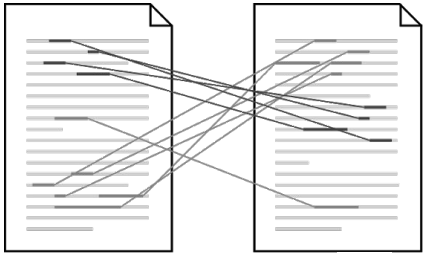
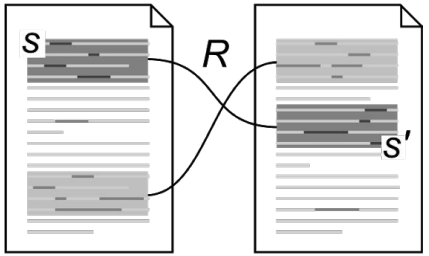
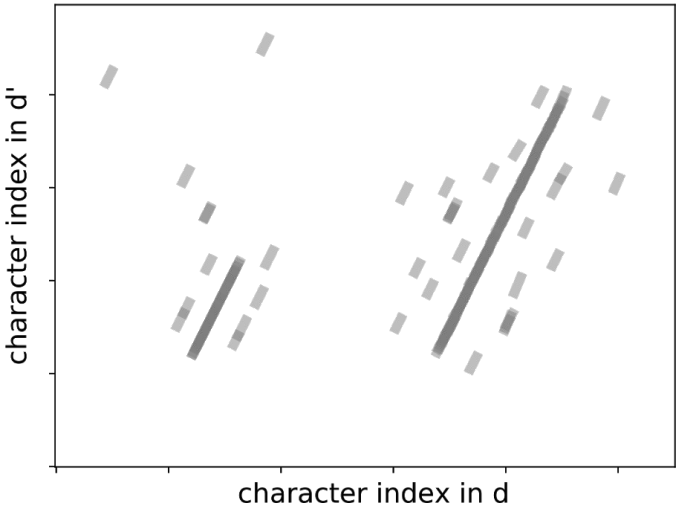


Matching seeds

Extension



Aligned passages



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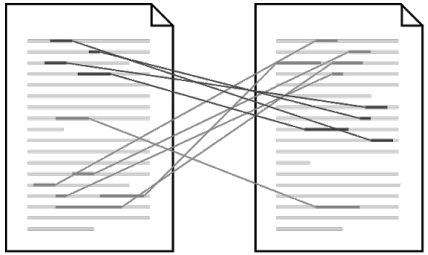

Matching seeds

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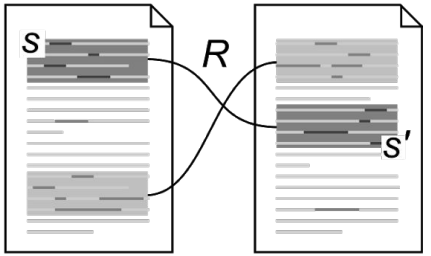

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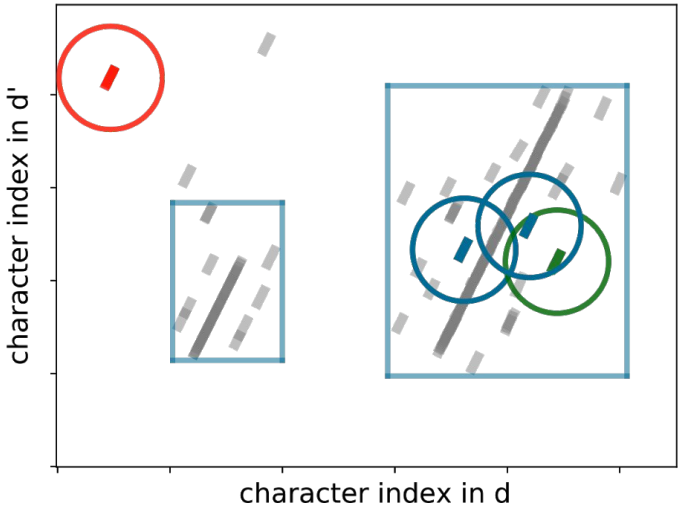
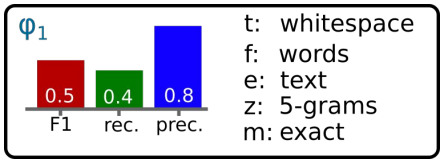


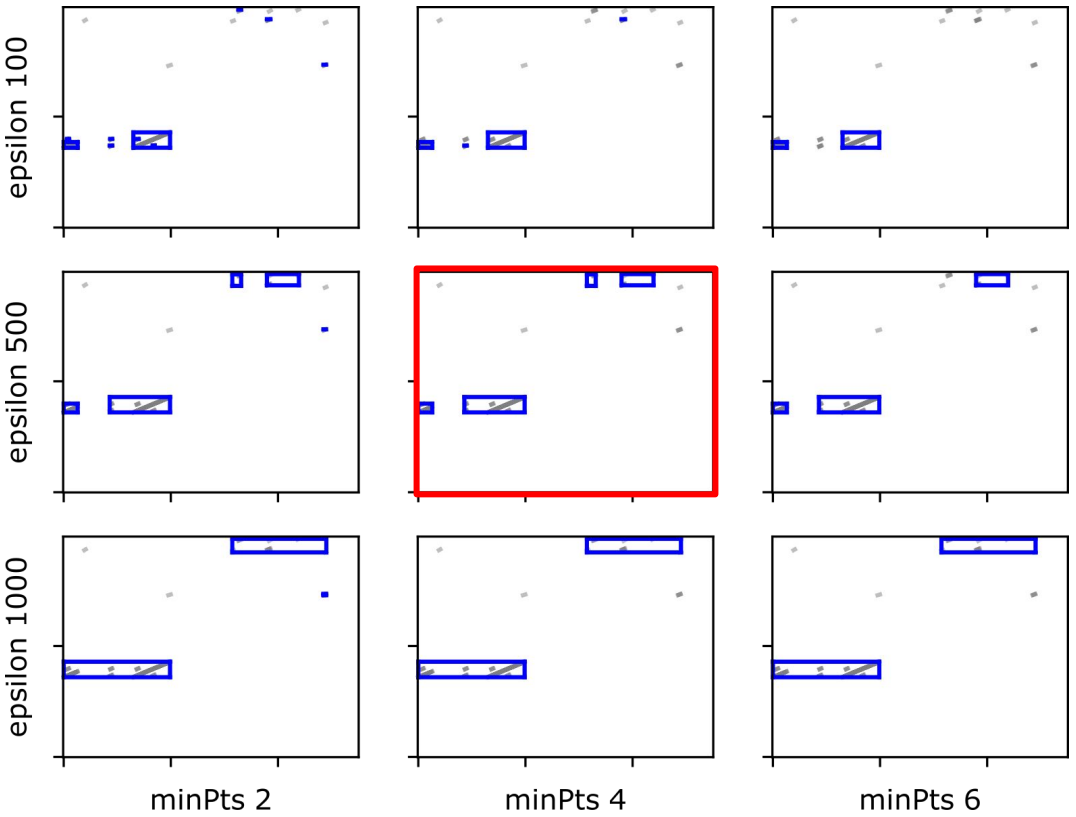
Core Point: if at least **minPts** other points within **epsilon** radius

Border Point: within **epsilon** of a core point

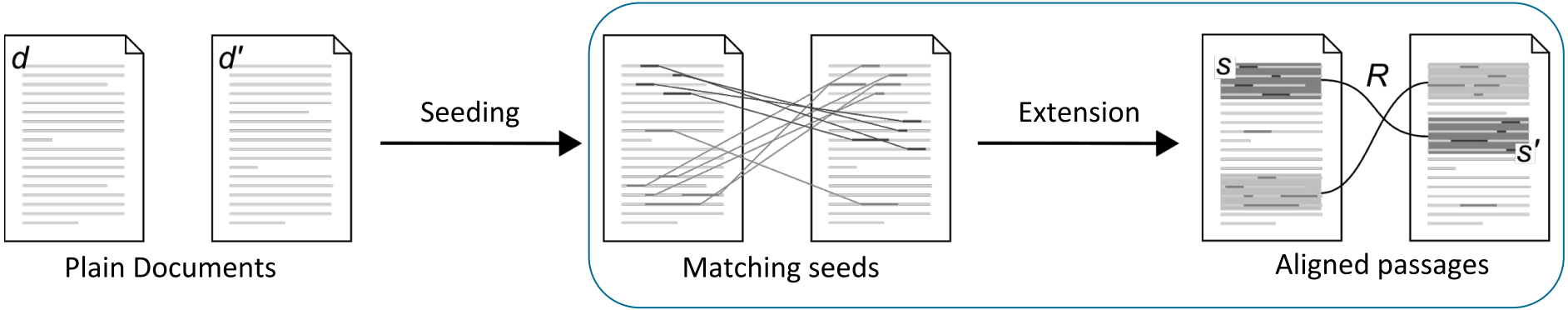
Noise Point: if neither core nor border point

Model of Extension





Contributions



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Hyperparameter estimation

- Collection estimation
  - Given the seeder, find the best parameters for all documents
  - Can be determined once with the ground truth

	None	collection estimate
F1	0.54	0.62

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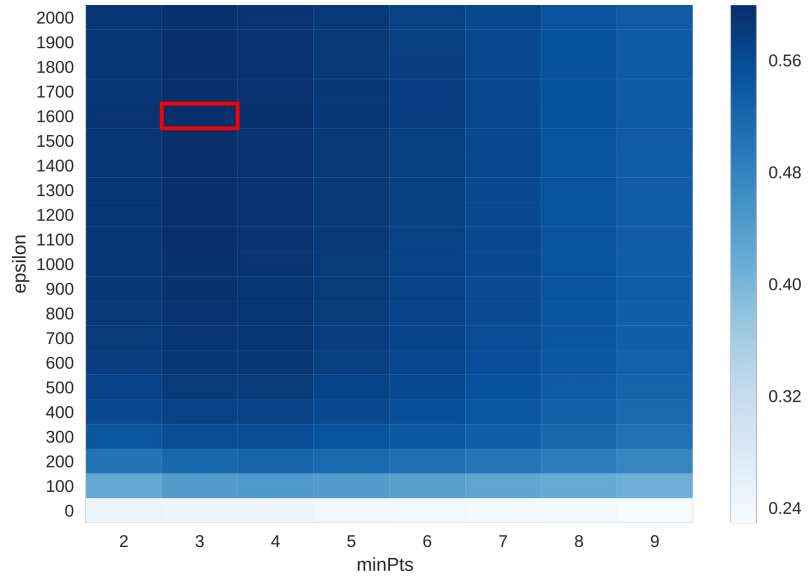
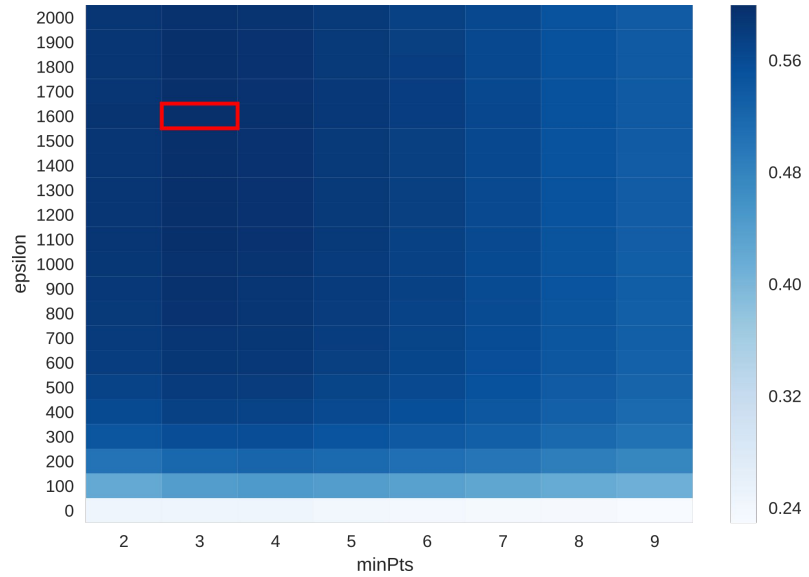


Hyperparameter estimation

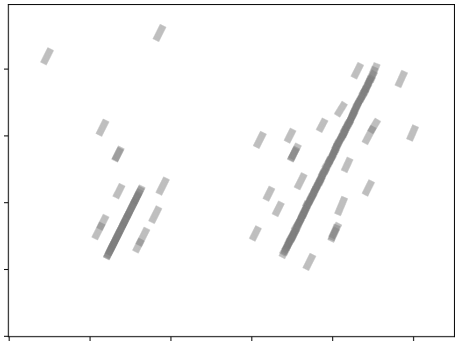
- Collection estimation
  - Given the seeder, find the best parameters for all documents
  - Can be determined once with the ground truth

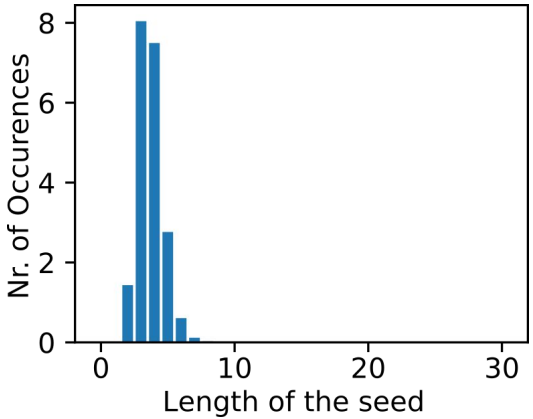
- Document estimation
  - Given the seeder and a pair of documents, find the best parameters for that particular pair
  - This can be learned

	None	collection estimate	per document optima
F1	0.54	0.62	0.72



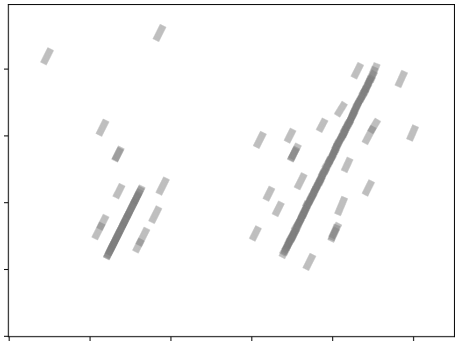
Hyperparameter estimation

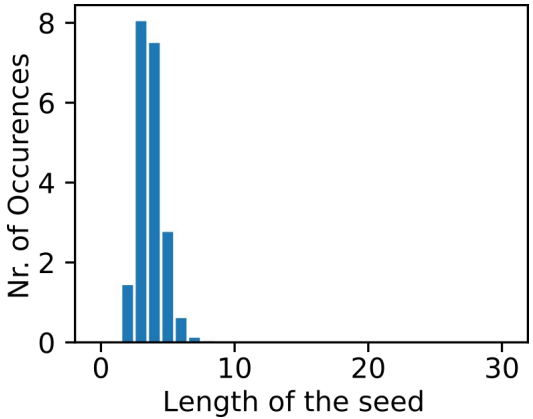




- Determine the truth (best parameters) for a pair of documents via gridsearch
- use length-frequency-histogram as features
- get 10.000 examples per seeder from the PAN corpora

Hyperparameter estimation

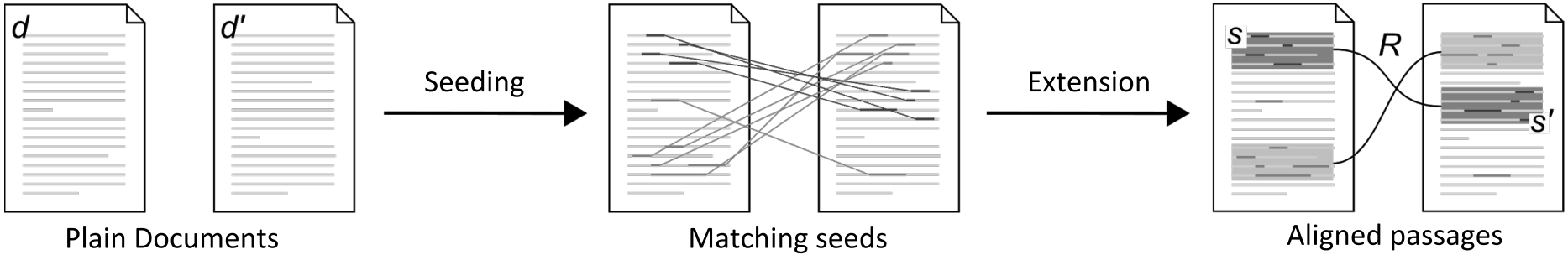




- Determine the truth (best parameters) for a pair of documents via gridsearch
- use length-frequency-histogram as features
- get 10.000 examples per seeder from the PAN corpora

	prediction	collection estimate	per document optima
$\varphi_1, \varphi_2 \rightarrow \varphi_1 \cup \varphi_2$	0.70	0.69	0.86
$\varphi_1, \varphi_3 \rightarrow \varphi_1 \cup \varphi_2 \cup \varphi_3$	0.65	0.69	0.85

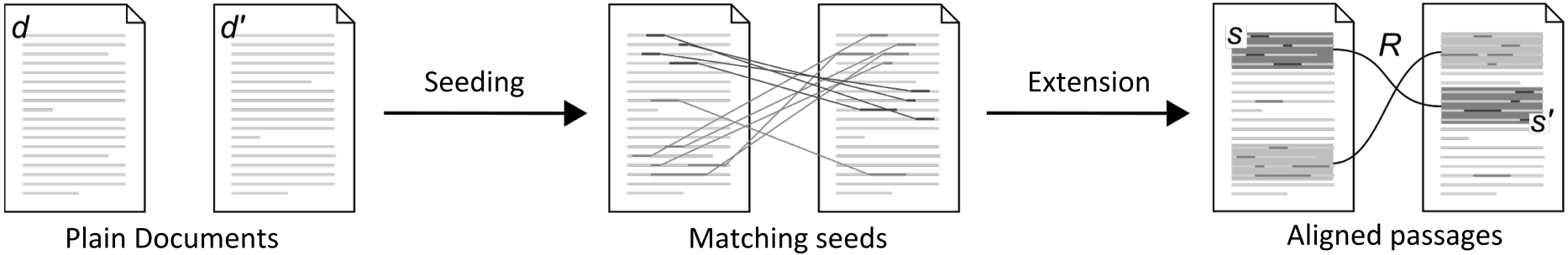
Contributions



- Model of seeding
- Seeder combination
- Relaxation

- Model of extension
- Parameter estimation

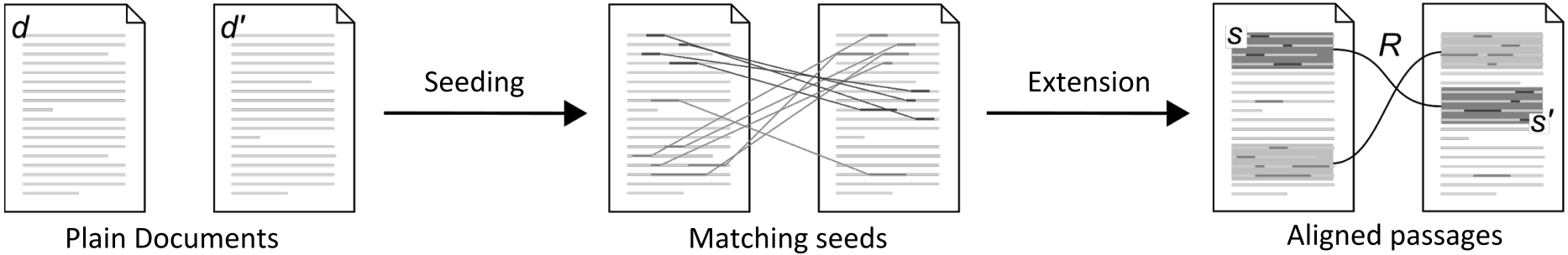
Future Work



- Model of seeding
- Seeder combination
- Relaxation
- Best Algorithm?

- Model of extension
- Parameter estimation
- Improved parameter learning

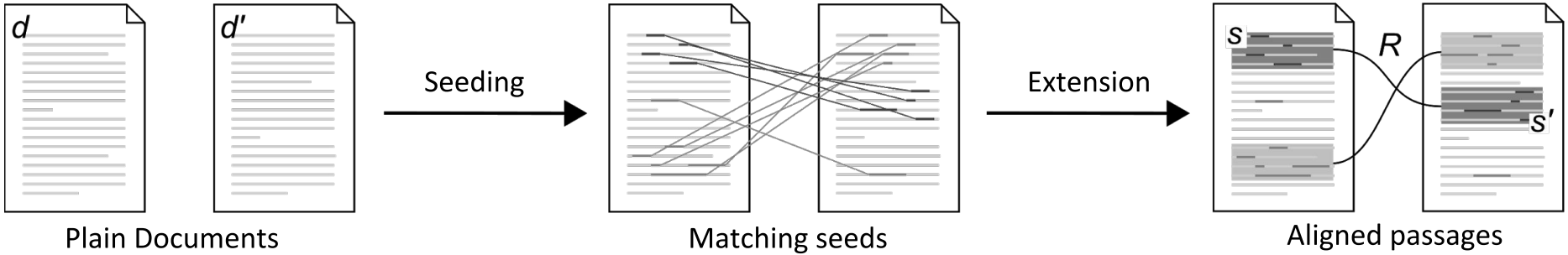
Future Work



- Model of seeding
- Seeder combination (Breeding)
- Relaxation (Mutation)
- Best Algorithm
- Genetic optimization

- Model of extension
- Parameter estimation
- Improved parameter learning

Thanks!



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