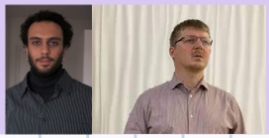
AI in Computer Assisted Language Learning for the Russian Language

Automatic Collocation Suggestion

Andrea Grillandi, Mihail Kopotev
U. of Helsinki



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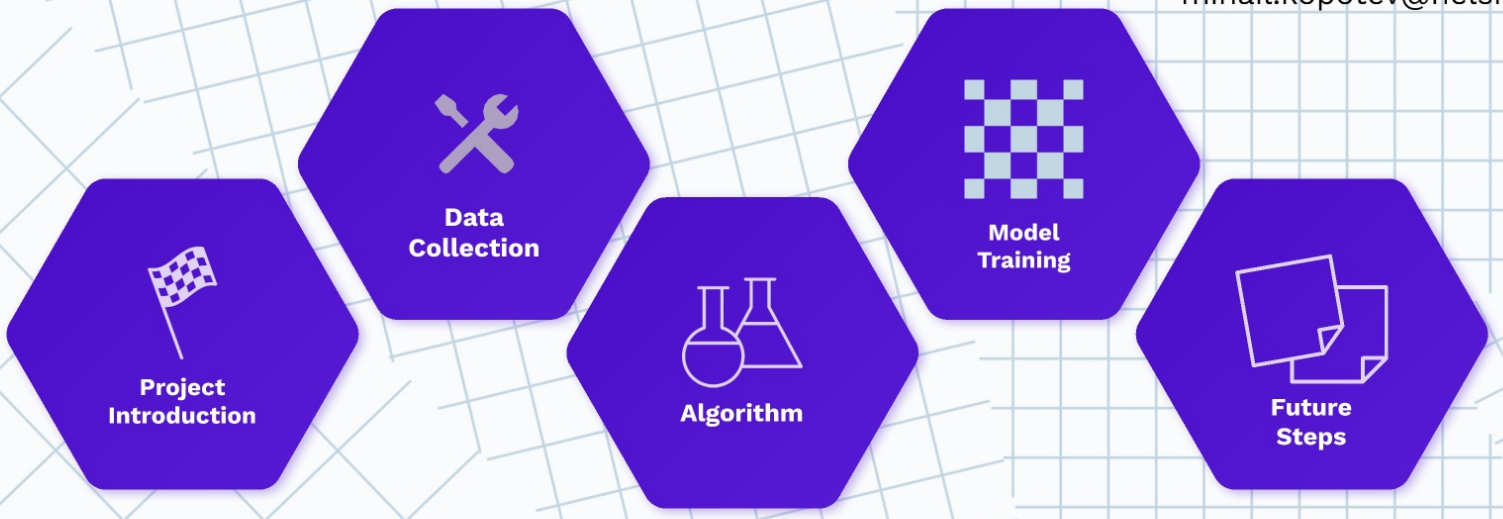


Introduction
• Automatic collocation suggestion
• CAT&kittens
An assistant for Russian academic writing
CAT
kittens
Collocation suggestion

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- Automatic collocation suggestion
- **CAT&kittens**
  An assistant for Russian academic writing

CAT

- CAT stands for Corpus of Academic Texts
- Standard used for comparison

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kittens
• learner texts
• written by L2 students or native speakers

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- Collocations - series of words which co-occur with a certain frequency
- Given a learner collocation, suggest semantically similar but more appropriate collocation
  e.g. "zone of research" -> "area of research"

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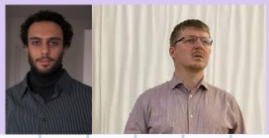

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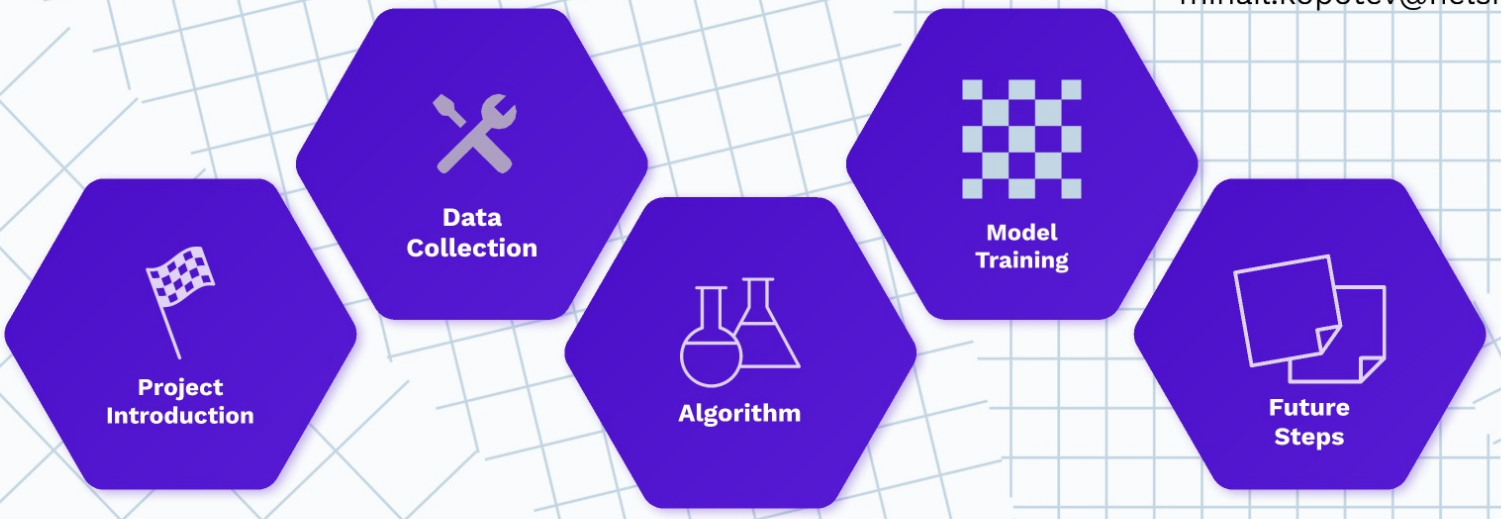


Data Collection and Preprocessing
• Academic texts from Cyberleninka
• Corpus composition
• Text preprocessing
Cyberleninka
Corpus
Preprocessing

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Cyberleninka
• scientific electronic library
• Russian academic articles

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Corpus composition

- ~ 60 mln tokens
- ~ 10 mln per domain
- 6 domains: Economics, Education and Psychology, Linguistics, Law, History, Sociology

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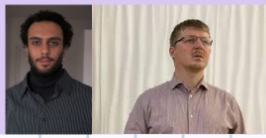

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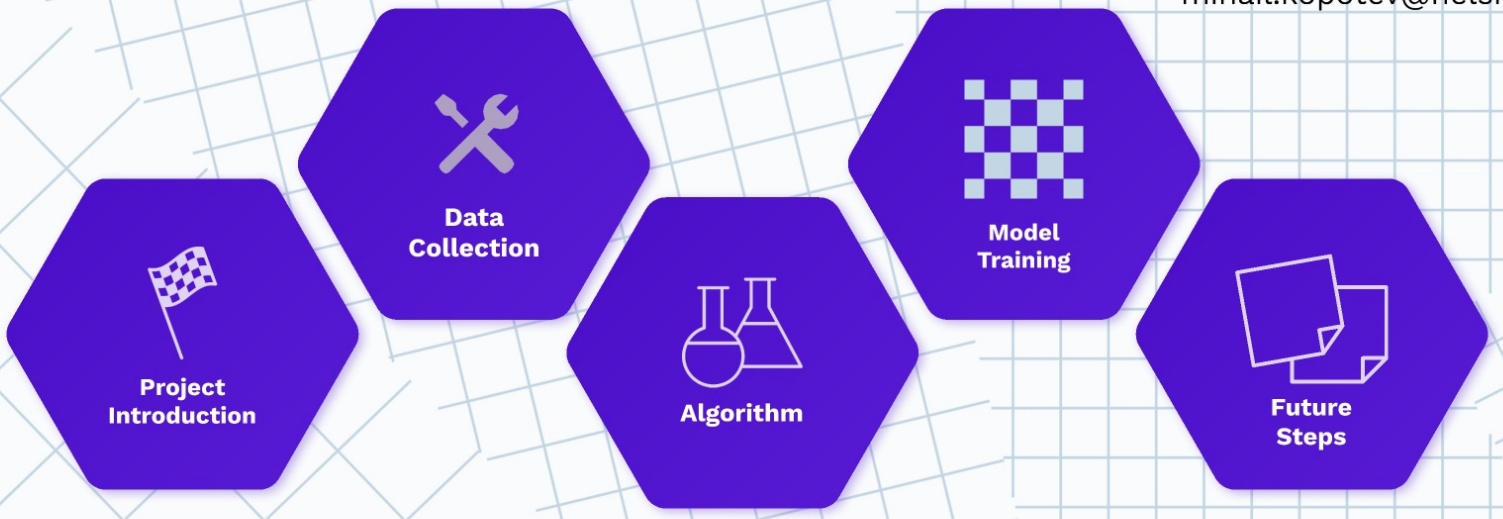


Collocation suggestion
1. search learner collocations on the CAT
2. if collocation is not found, suggest new collocation based on static or dynamic ML models
3. keep if found in corpus, else discard
4. sort suggested collocations according to cosine (=semantic) similarity to the original learner collocation
ngram search
Static models
Dynamic models
Filter & Sort

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Find collocations

- learner text is split into 2-grams, 3-grams and 4-grams
- "NLP is a key area of research" -> ["NLP is a", "is a key", "a key area", "key area of", "area of research"]
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Static Models

- Static because non-contextual
- w2v, fastText, GloVe
- *zone of research
  area of research
  field of research
  zone of study
  area of study

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Dynamic Models

- Dynamic because word representations are contextual
- BERT and GPT

- NLP is a key ***zone of research** ->
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- Sum up static semantic representations of all words in collocation (both for target and suggested collocation)
- Compute cosine similarity with the target collocation
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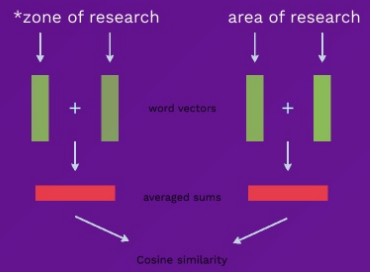

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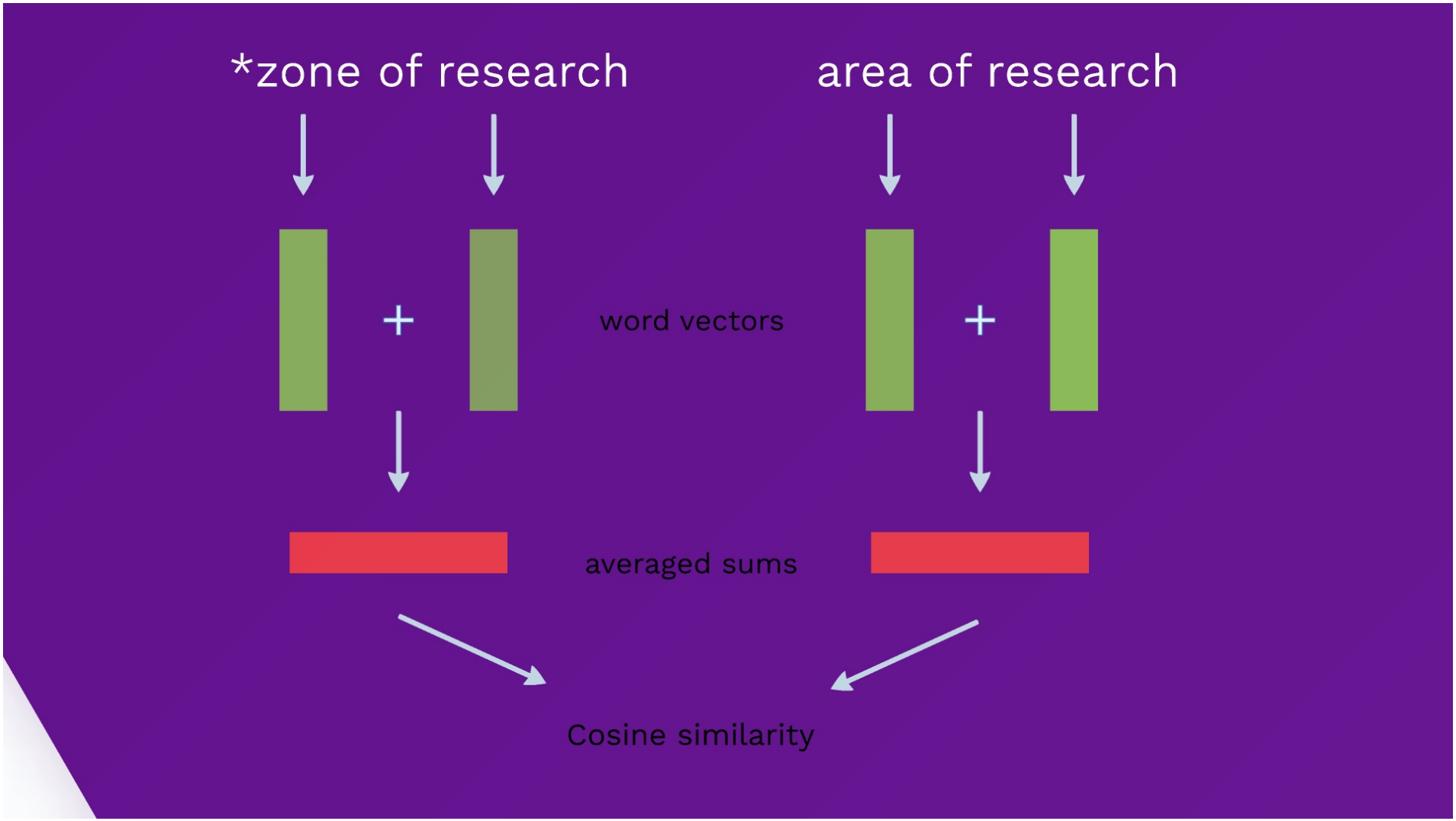
*zone of research
area of research
word vectors
averaged sums
Cosine similarity


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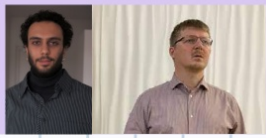

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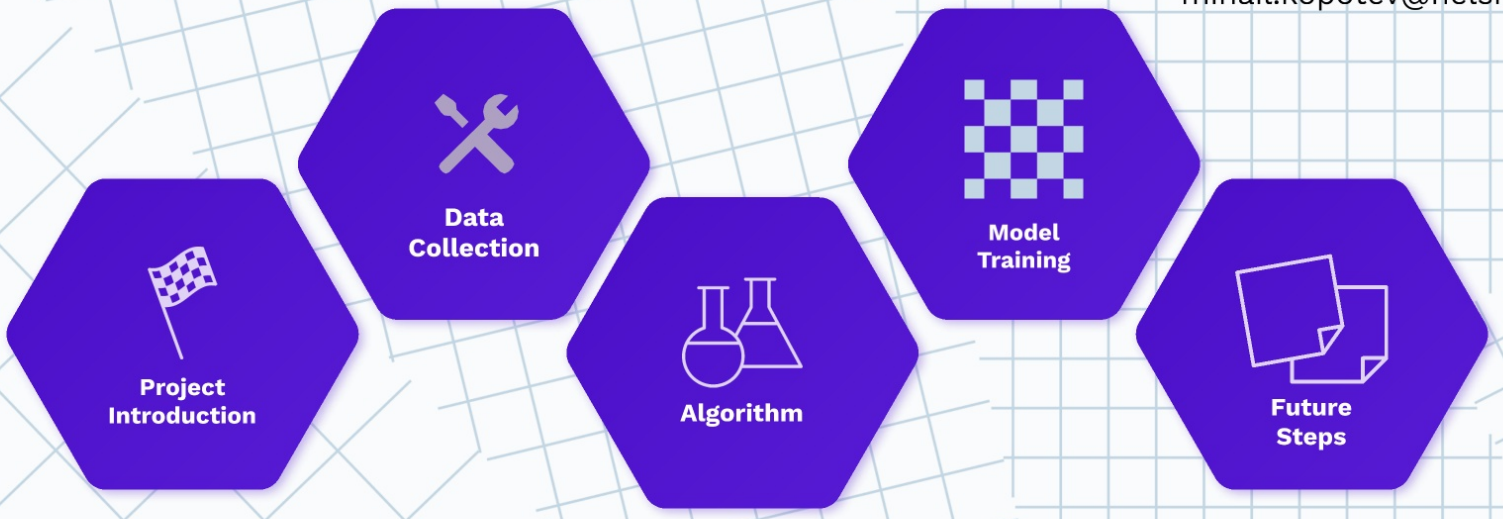

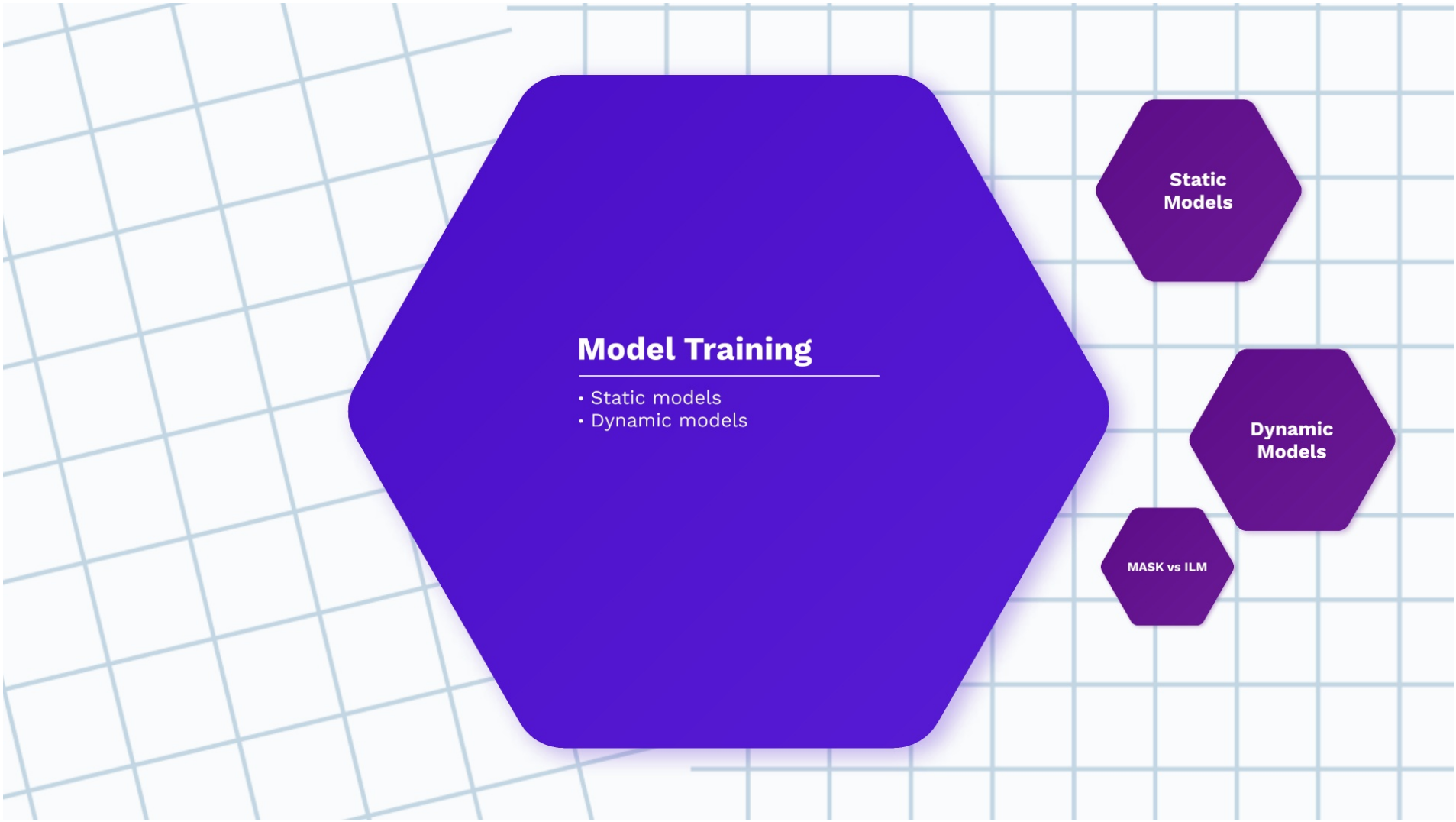
Model Training
• Static models
• Dynamic models
Static Models
Dynamic Models
MASK vs ILM

Static models

- Lemmas + POS: "zone_N of_P research_N"
- Gensim for w2v and fastText
- Stanford GloVe repository
- One model per domain and one for full data

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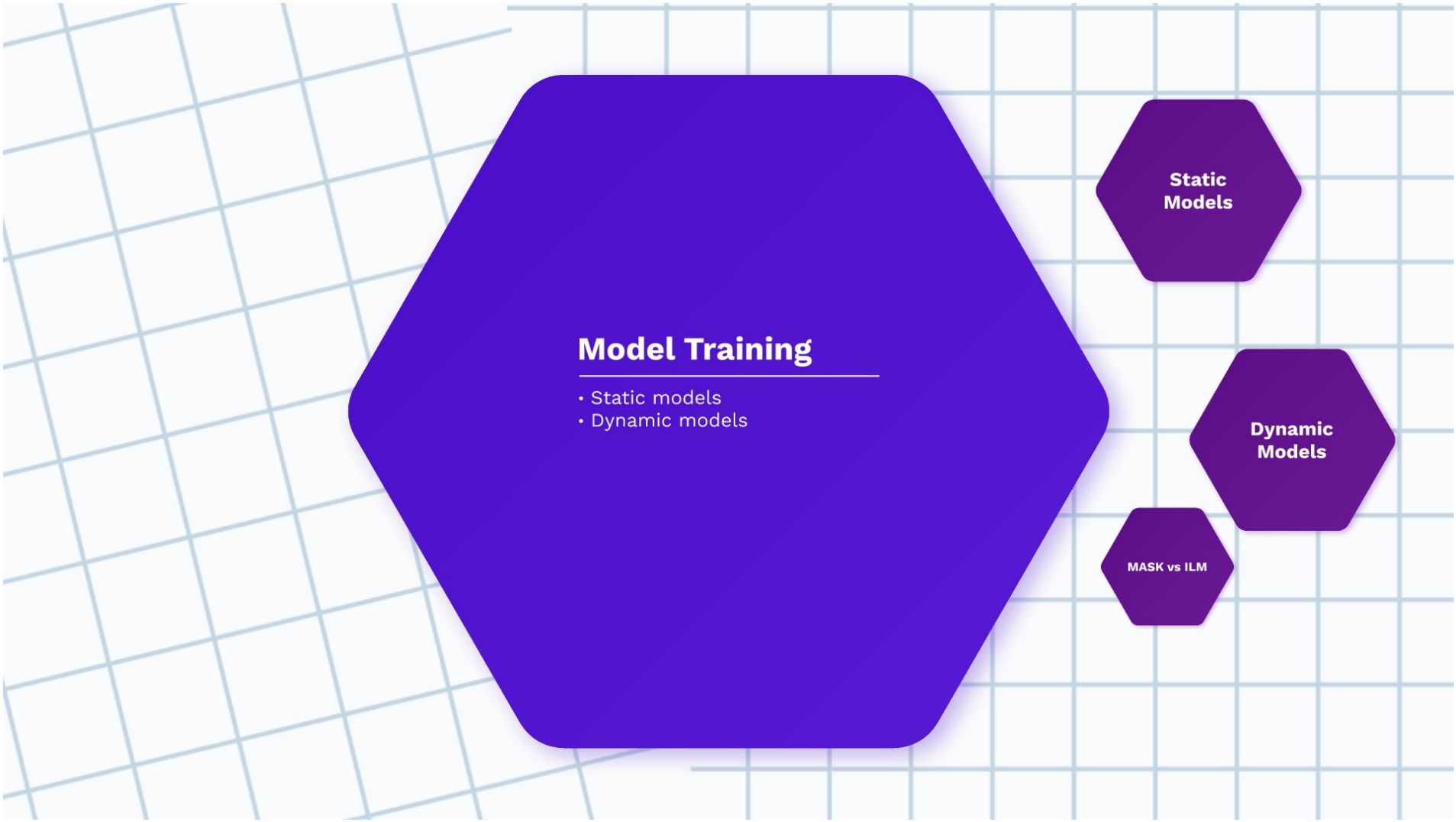
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- BERT large:
  - 340 mln. parameters, trained on NL inference dataset
  - and fine-tuned on our lemmatized data
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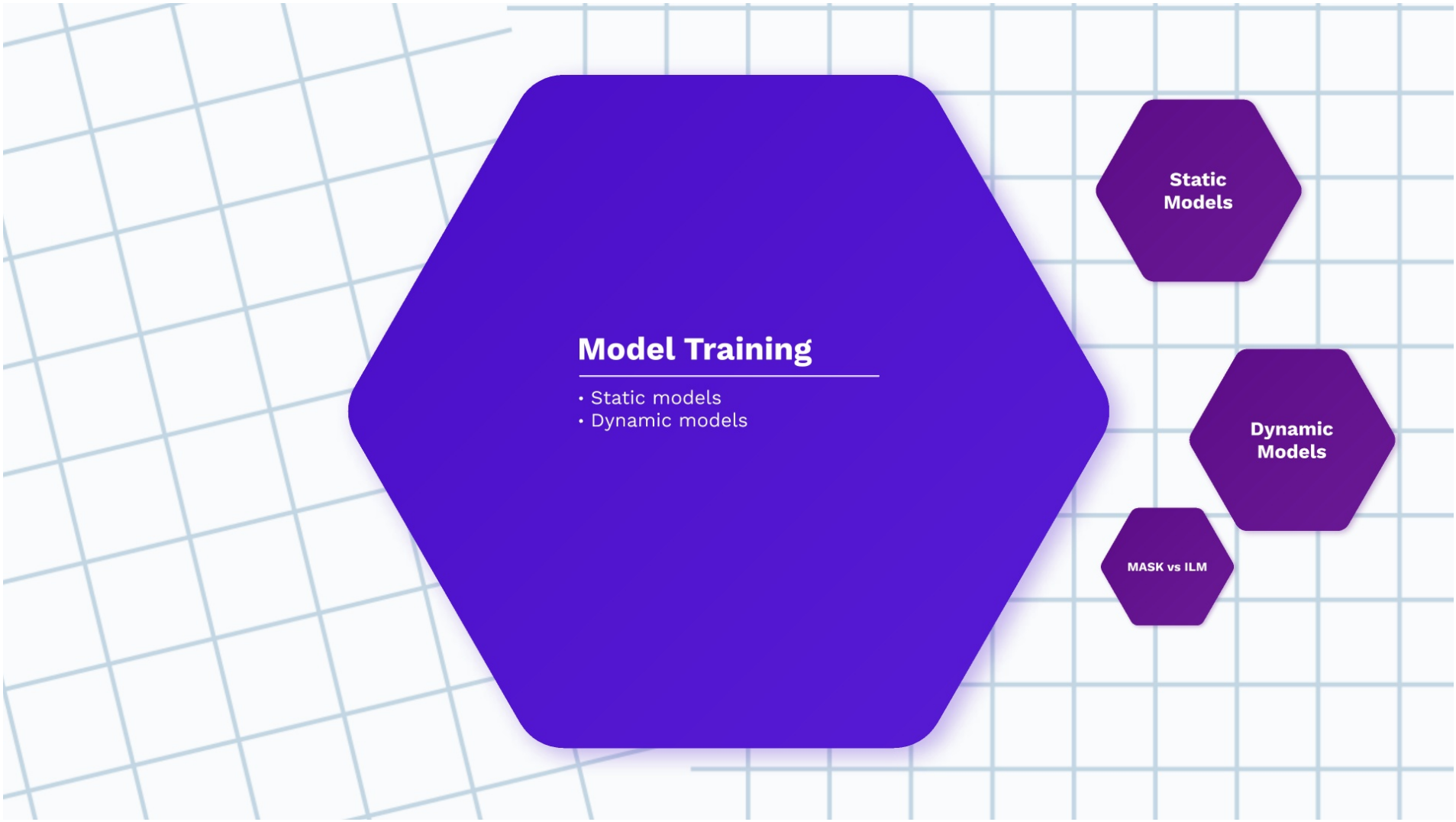
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Masked Models vs. Infill model (ILM)

- "NLP is a key [MASK] of research -> ["area", "field", ...]
- "NLP is a key [infill] -> ["area", "research field", "area of research"]

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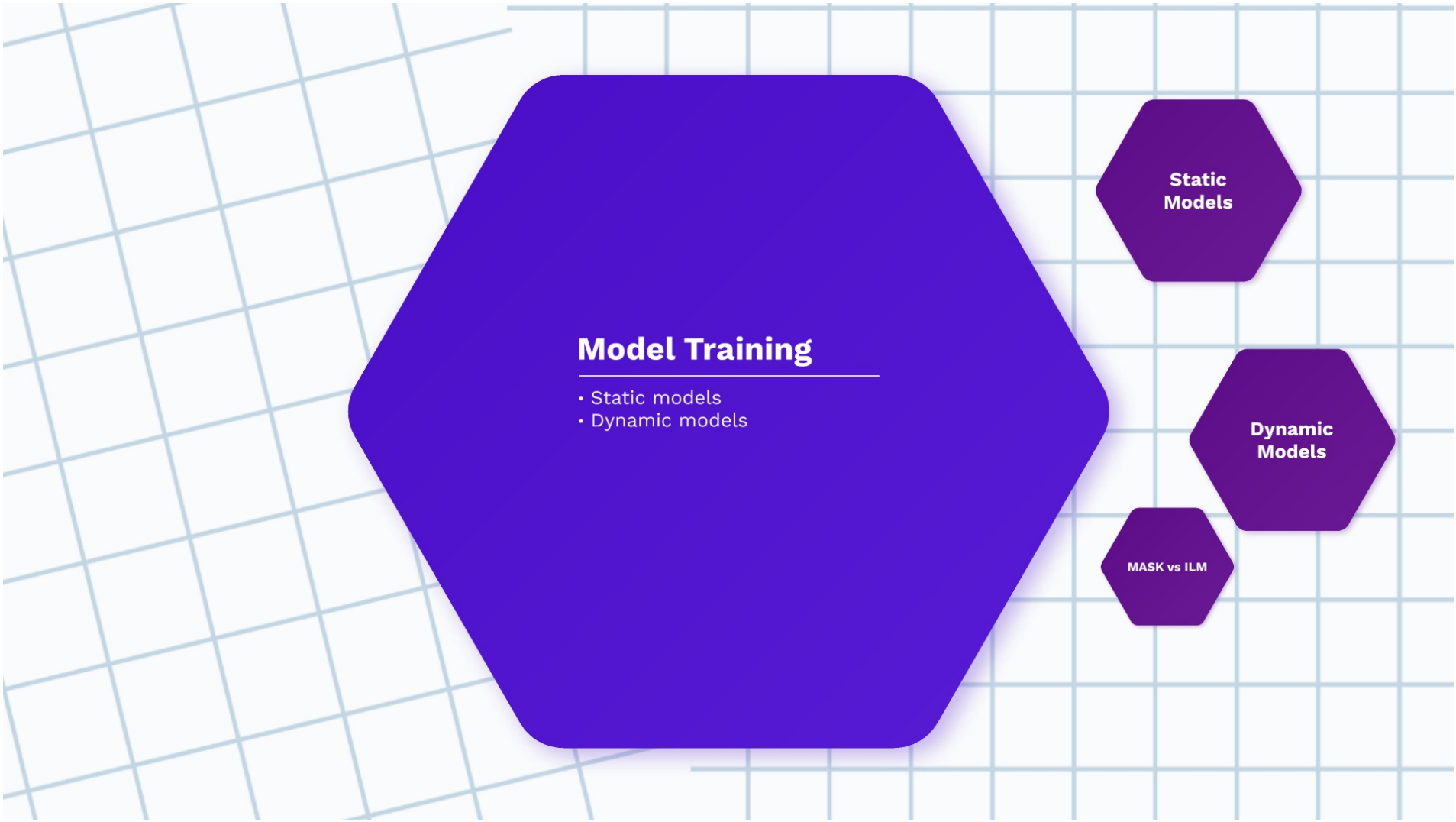
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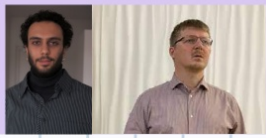

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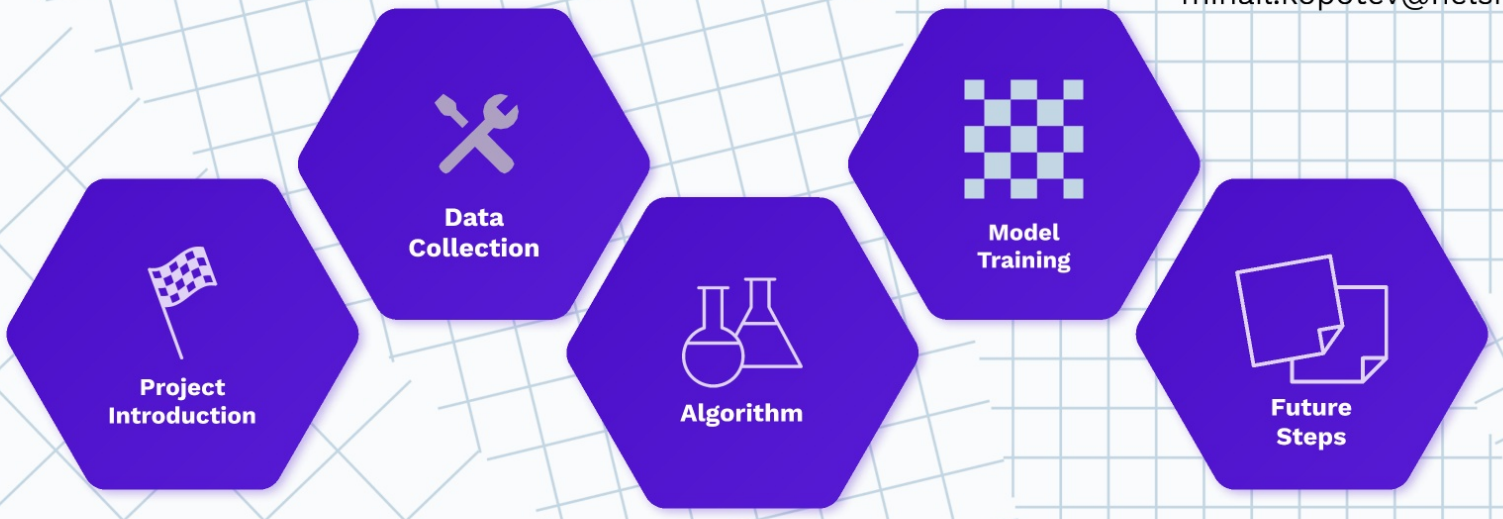

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- Data processing -- DONE
- Training the models -- DONE
- ILM framework tuning -- DONE
- Evaluation of the results, choosing the best model(s) and parameters -- IN PROGRESS

- Integration the algorithm into a AI-writing-assistant similar to Grammarly, but for the Russian language -- TO BE DONE

GRAMOTA.RU

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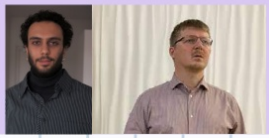

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