

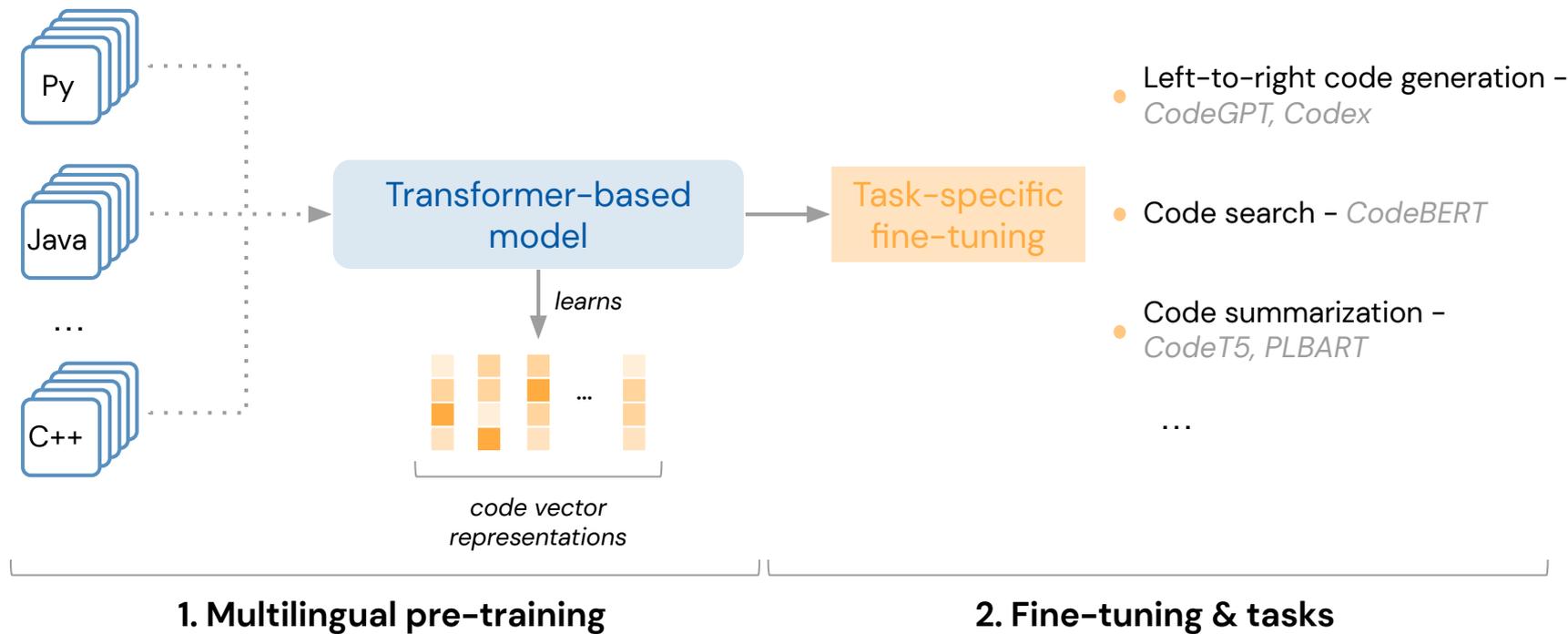
Better Modeling the Programming World with Code Concept Graphs-augmented Multi-modal Learning

Martin Weyssow, Houari Sahraoui, Bang Liu



Context & Motivation

State-of-the-art learning paradigm



State-of-the-art learning paradigm

State-of-the-art deep learning models of code show great robustness and generalization on different data distribution and tasks.

They

- Learn from syntax → sequences of code tokens
- Learn from global information → self-attention layers

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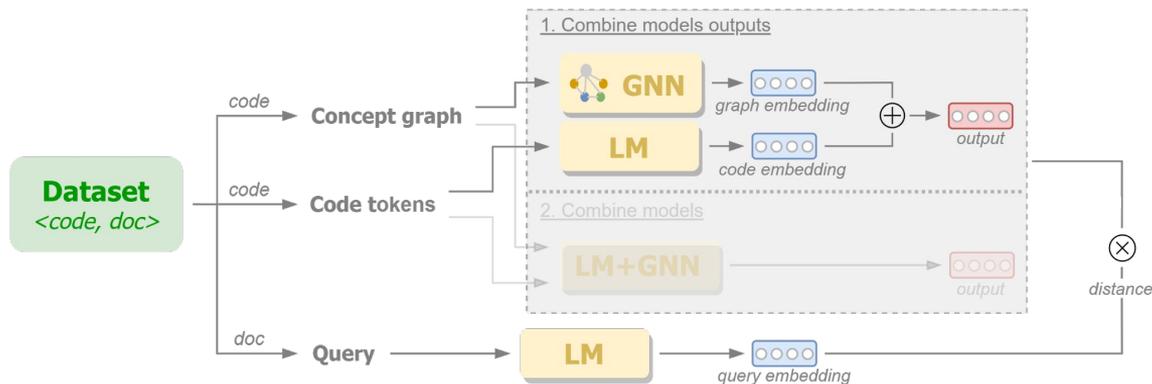
But

- Programs are concept-based → concept graphs
- Programs are multimodal! → learn from multiple level of abstraction

Can we learn better representations of code?

Multimodal learning with code concept graphs

Proposed approach. Joint-learn a BERT-like language model (LM) and a graph neural network (GNN).



Applicability to code search

- find the best code candidate given a natural language query
- simple fusion of code and concept graph representations
- improvement over CodeBERT, a strong baseline

Discussion

Can we have large multimodal pre-trained models of code?

- learn general-purpose code representations

and/or, **should we fine-tune existing pre-trained models in a multimodal fashion?**

- define modalities specific to the task

Scaling law → more parameters = higher accuracy on the tasks at hand

- **Can we observe the same trend with multimodal learning?**
- **How does multimodal learning compare to unimodal learning *w.r.t* this law?**
- **Are the data processing and fusion worth the time/resources? → trade-off**

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