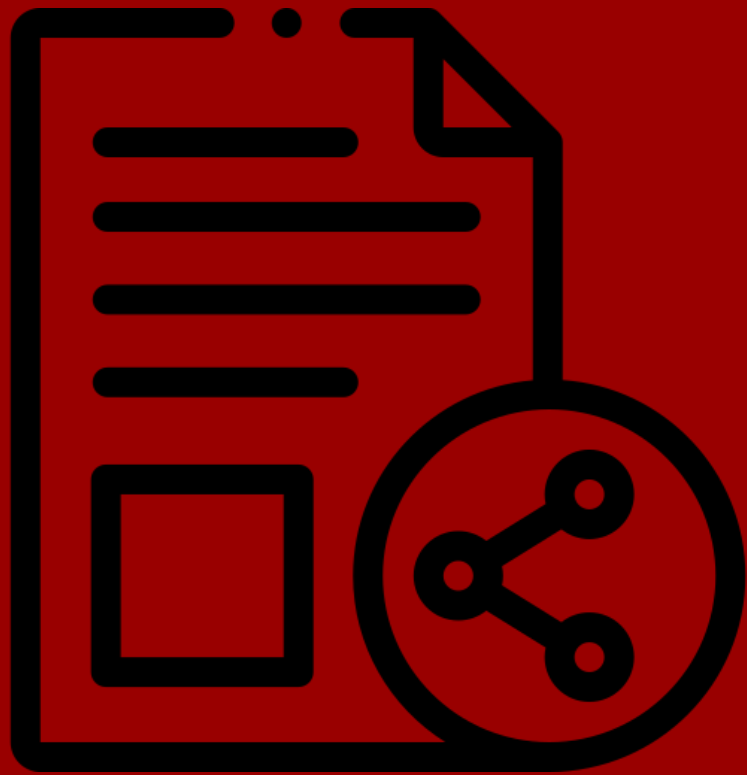


Big Data Analytics and Text Mining Project

Testing GraphAny on a RelBench task

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University of Bologna

01 The Context

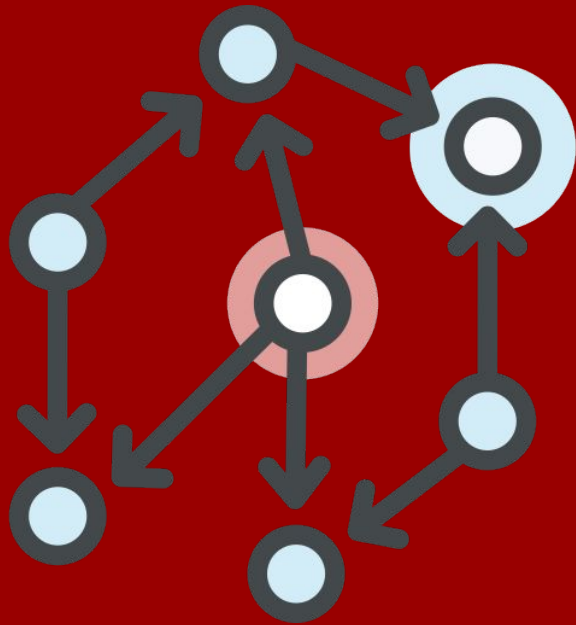


GraphAny

A fully-inductive Node Classification on Arbitrary Graphs

It is trained to perform node classification on:

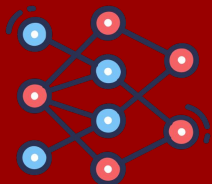
- Any graph.
- With any feature.
- With any number of labels.



Totally Inductive Node Classification!

Some other fancy aspects

GraphAny is a young model, (june 2024 on Arxiv)!



Built on only 5 LinearGNNs!

Tested on 27 datasets.



And the number of parameters?



4 different checkpoints available.



RelBench

Open benchmark for machine learning over relational databases

Full of interesting tasks to perform on relational graphs

More importantly: we have some Binary Node
Classification Tasks!

Project Idea

Import a task from RelBench and test GraphAny on it!

But How?

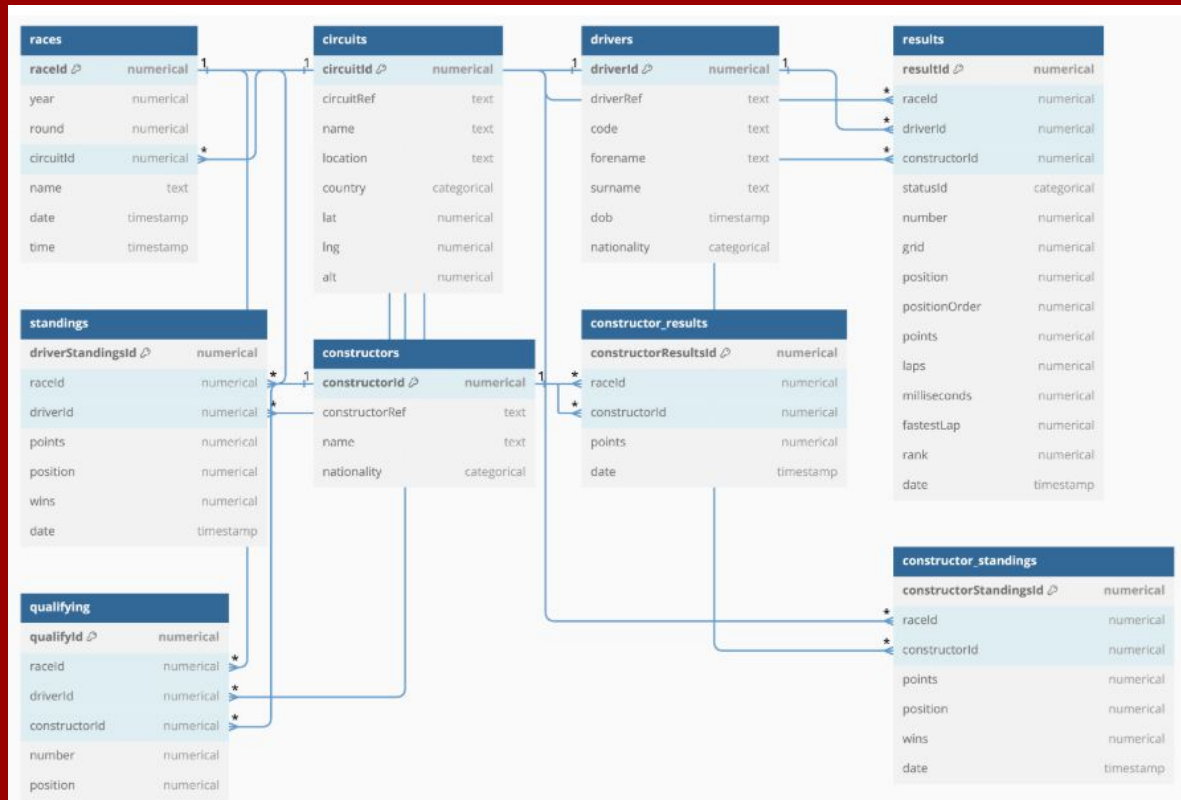
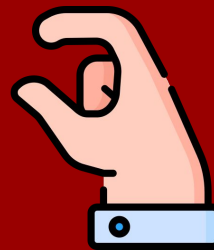


02 The Approach



The choice: F1 Database

The smallest dataset with a node classification task.



The task: For each driver predict if they will DNF (did not finish) a race in the next 1 month

The HeteroGraph problem

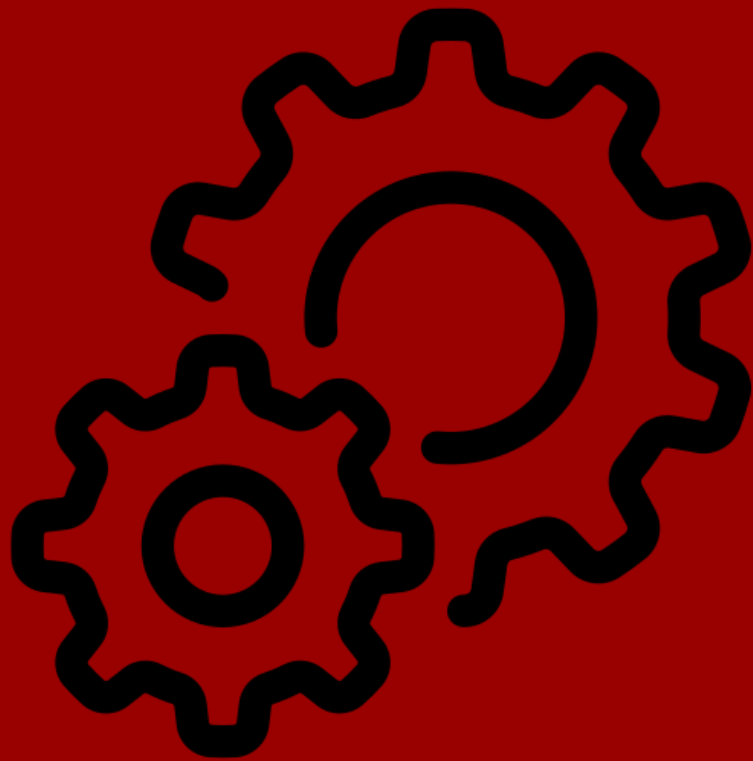
Different nodes with different features...

Solution: Linearization and Glove embedding!

```
HeteroData(  
  constructor_standings={  
    tf=TensorFrame([13051, 4]),  
    time=[13051],  
  },  
  results={  
    tf=TensorFrame([26080, 11]),  
    time=[26080],  
  },  
  circuits={ tf=TensorFrame([77, 7]) },  
  drivers={ tf=TensorFrame([857, 6]) },  
  races={  
    tf=TensorFrame([1101, 5]),  
    time=[1101],  
  },  
  standings={  
    tf=TensorFrame([34124, 4]),  
    time=[34124],  
  },  
  qualifying={  
    tf=TensorFrame([9815, 3]),  
    time=[9815],  
  },  
  constructors={  
    tf=TensorFrame([211, 3]) },  
  constructor_results={  
    tf=TensorFrame([12290, 2]),  
    time=[12290],  
  }  
)
```

03

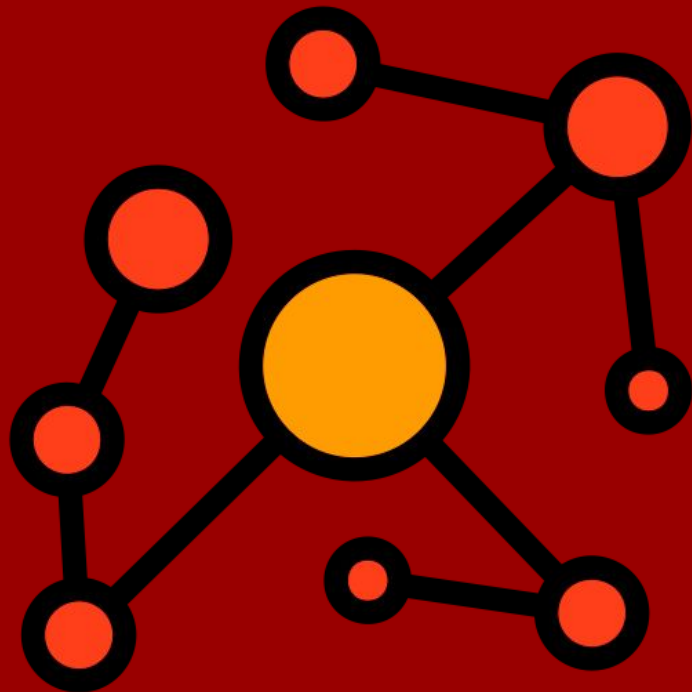
Experimental Setup



Our Dataset

A HUGE Knowledge Graph:

- 97605 nodes.
- 455432 edges.
- but only 3 labels.



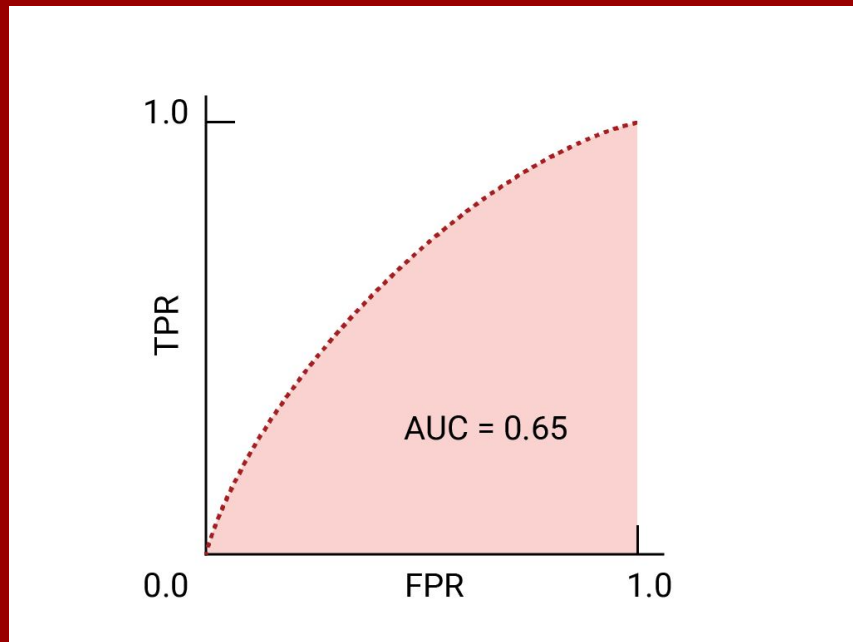
The Metrics

1. F1-Score

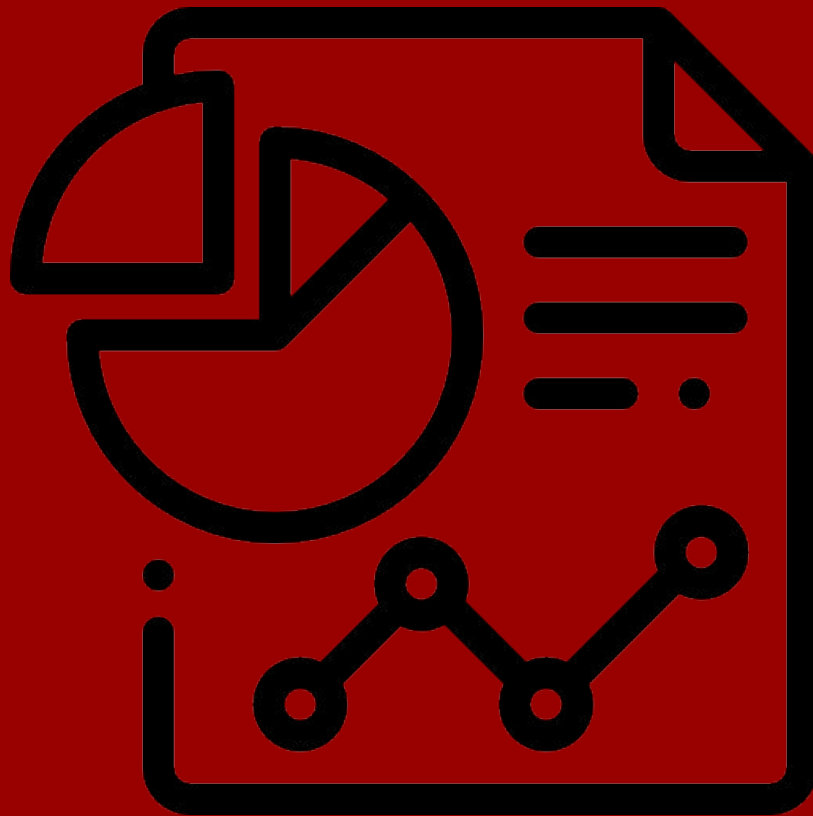


2. Binary ROC AUC

3. One-vs-rest ROC AUC



04 The Results

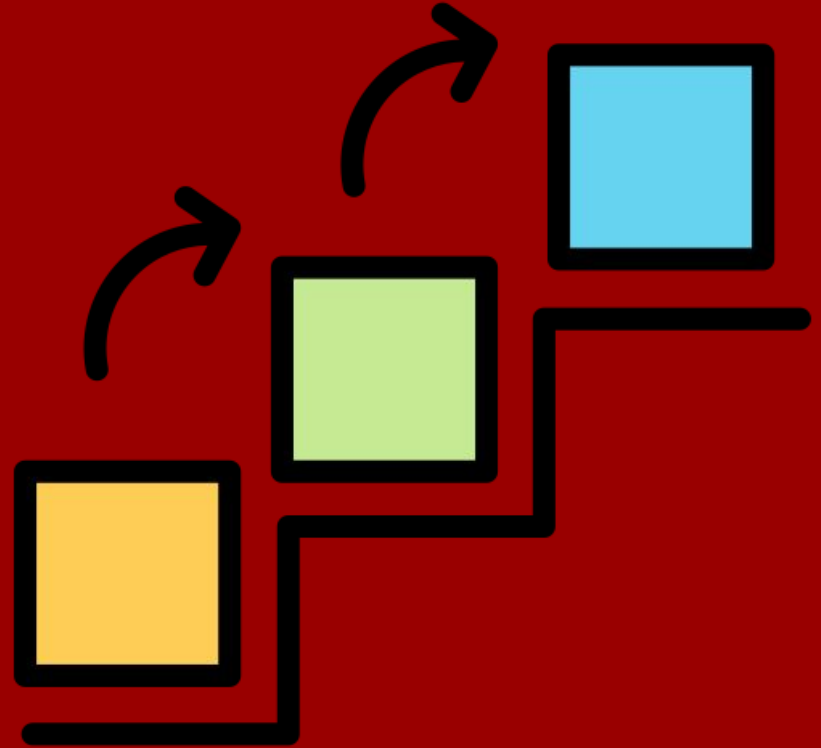


GraphAny performances on Task

Checkpoint	F1-score	Binary AUROC	One-vs-Rest AUROC
Wisconsin	85.71	58.80	53.70
Cora	85.71	60.19	56.25
Arxiv	85.71	56.94	53.47

Table 1: GraphAny Performances on Formula 1 Test set RelBench Knowledge Graph.

05 Future Project Improvements



Some critical aspects

- We tested the model on only one task.
- We tested the model on only one dataset.



Our metrics could be biased by the task choice!

Thank you for your attention!

