Big Data Analytics and Text Mining Project

Testing GraphAny on a RelBench task

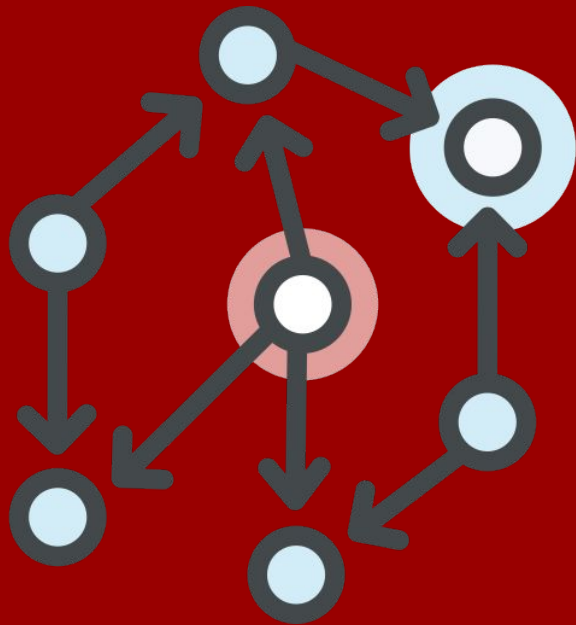Riccardo Romeo
University of Bologna

01
The
Context

GraphAny

A fully-inductive Node Classification on Arbitrary Graphs

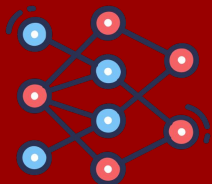It is trained to perform node classification on:

- 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)!   **NEW**

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

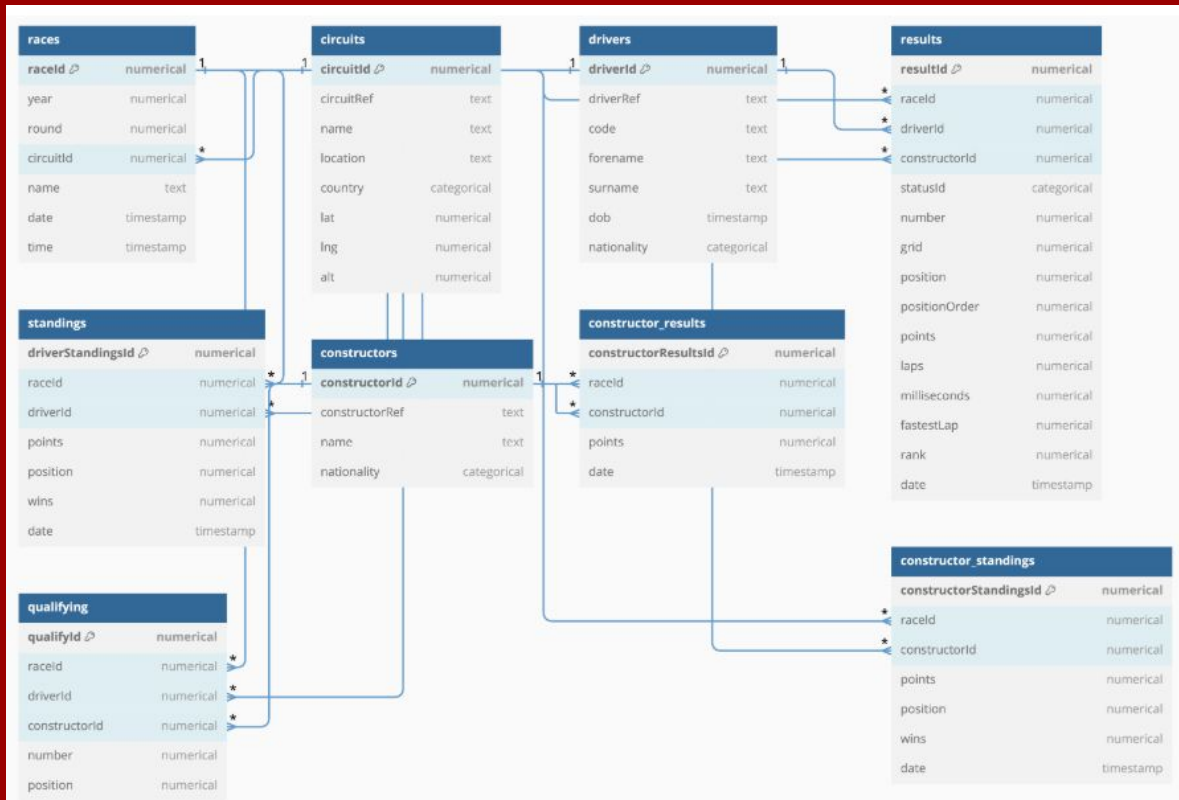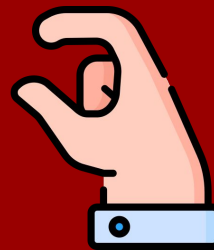Import a task from RelBench and test GraphAny on it!

But How?

02
The
Approach

The choice: F1 Database

The smallest dataset with a node classification task.

The task: For each driver predict the 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={
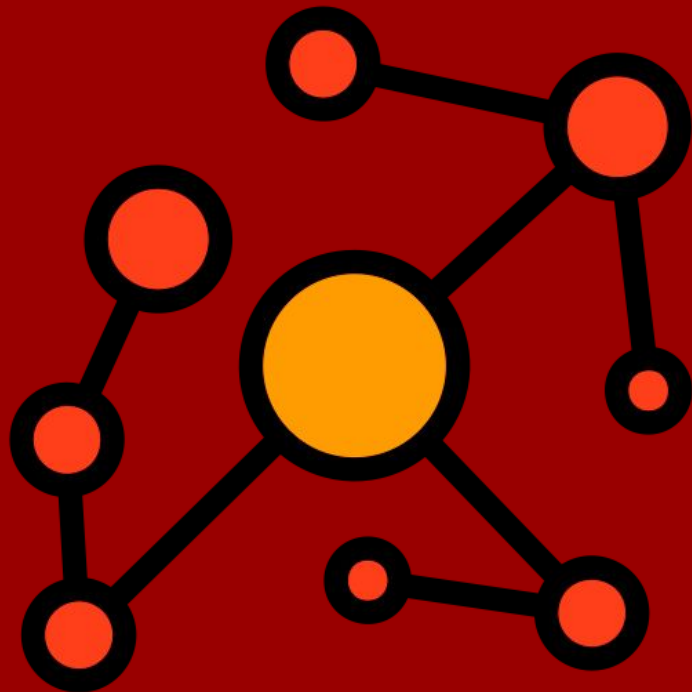   tf=TensorFrame([12290, 2]),
    time=[12290],
  }

03
Experimental
Setup
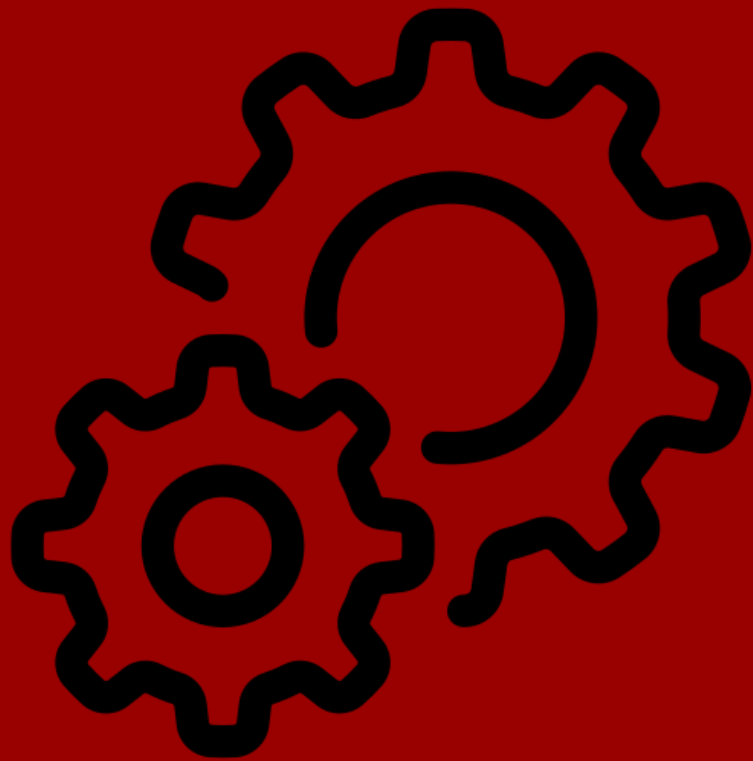
Our Dataset

A HUGE Knowledge Graph:

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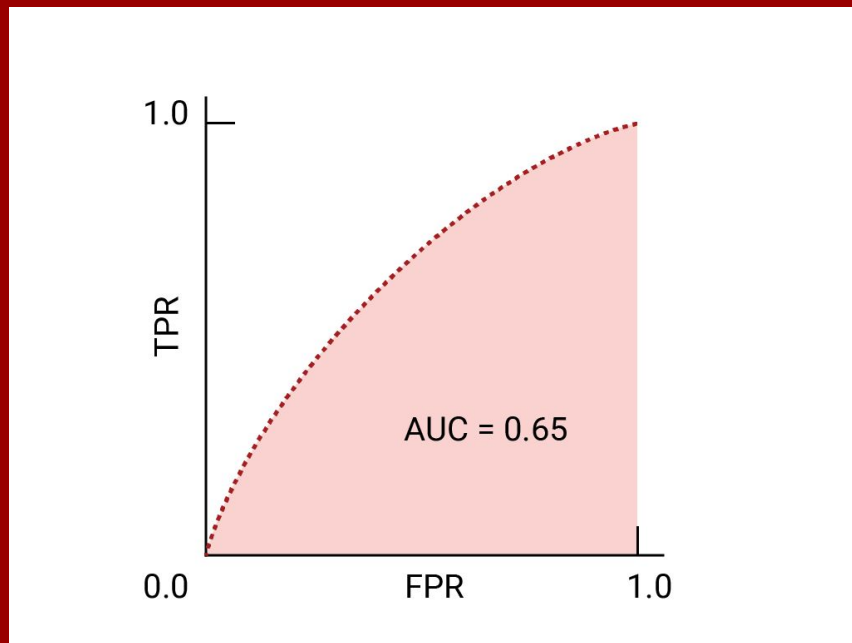
- 455432 edges.
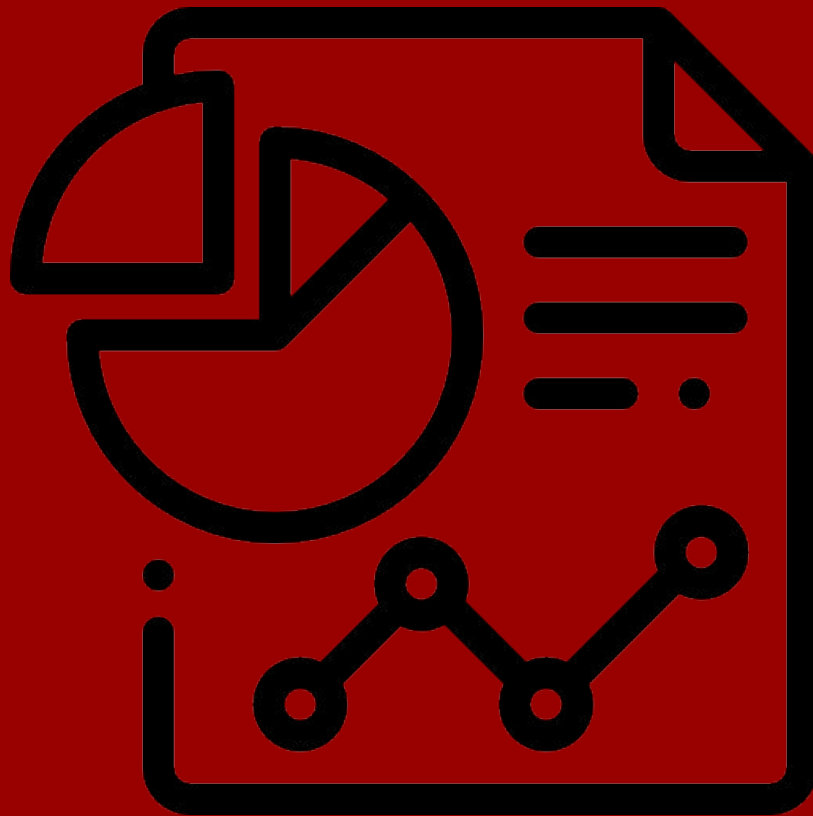
- but only 3 labels.

The Metrics

1. F1-Score

2. Binary ROC AUC

3. One-vs-rest ROC AUC

AUC = 0.65

04
The
Results

GraphAny performances on Task

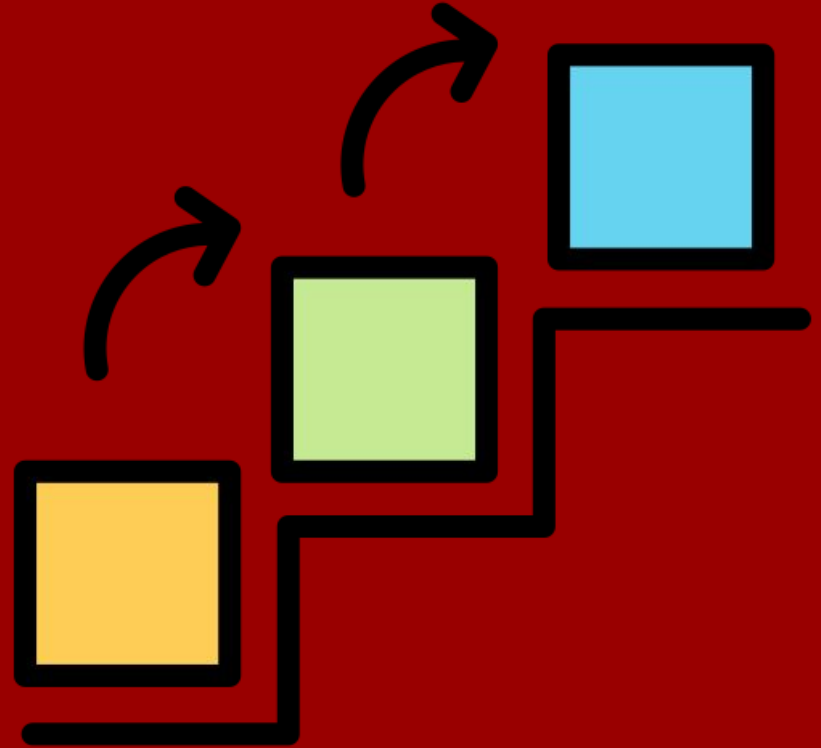| Checkpoint	F1-score	Binary AUROC	One-vs-Rest AUROC
Wisconsin	85.71	58.80	53.70
Cora	85.71	60.19	56.25
Arxiv	85.71	56.94	53.47

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 baised by the task choice!

Thank you for your attention!