MR04 Identify citations for research software in scientific articles

Background
For years, Graph Neural Networks have been growingly adopted for cases where data are not independent and identically distributed. Drug-protein prediction, social network clustering and scientific article/software recommendations are examples of applications where GNN has succeeded. However, it is not straightforward to model research articles and research software in the same graph, primarily since these last ones deal with complex heterogeneous metadata contents, formats, and source code containing both programming and natural language.

Goal
We aim to use Heterogeneous Graph Neural Networks to identify software in mathematical research articles, emphasizing software metadata. The approach must be then implemented in Julia using standard libraries.

Tasks
• Set up a Julia environment on your computer
• Build a pipeline to prepare swMATH and zbMATH (restricted to ArXiv sources) data and metadata
• Use standard libraries to inject the relevant data in a GNN model and train this model to identify software in scientific articles

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MR07 Mining information of swMATH software

Background

swMATH indexes software introduced by zbMATH articles. The metadata collected by zbMATH are essentially harvested by hand, with article as essential support to find information. However, intrinsic metadata of software are much unexplored and could considerably help with enriching the swMATH catalog of information.

Goal

We aim to use the somef library to extract intrinsic metadata of software repositories identified in swMATH.

Tasks

- Install the package https://github.com/KnowledgeCaptureAndDiscovery/somef
- Build a pipeline in python to extract intrinsic metadata
- Compare the extrinsic metadata of swMATH and the intrinsic metadata harvested in software repositories