DARTpaths visualisation

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Background

- **Toxicology** is the study of **toxic substances** that can have **adverse effects** on **living organisms**.
  - ➢ Developmental And Reproductive Toxicity (**DART**)
  - ➢ Linking different **biological processes** to **adverse effects**.
- **DART testing**
  - ➢ Required to assess the impact of **new chemicals** on adult fertility and embryonic development
  - ➢ These tests use **animals** and are **very expensive** and **time consuming**

Objectives

- **Interest**: assessing, predicting and improving the DART testing of the chemicals using computational approaches
  - ➢ The chemical component is linked to biochemical pathways and the associated phenotypic changes.
- **Goal**: Development of an **interactive visualization tool** to interpret **developmental and reproductive toxicity** by predicting **the potential toxicity of a new chemical**

Methods

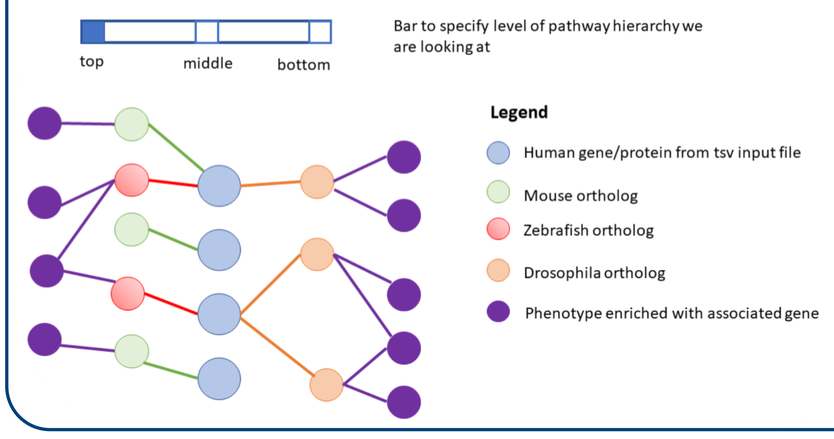
Data

- **Databases**: Ensemble, Reactome, Wormbase, Zfin, MGI, Ensembl, Flybase
- **Pathways**: Reactome

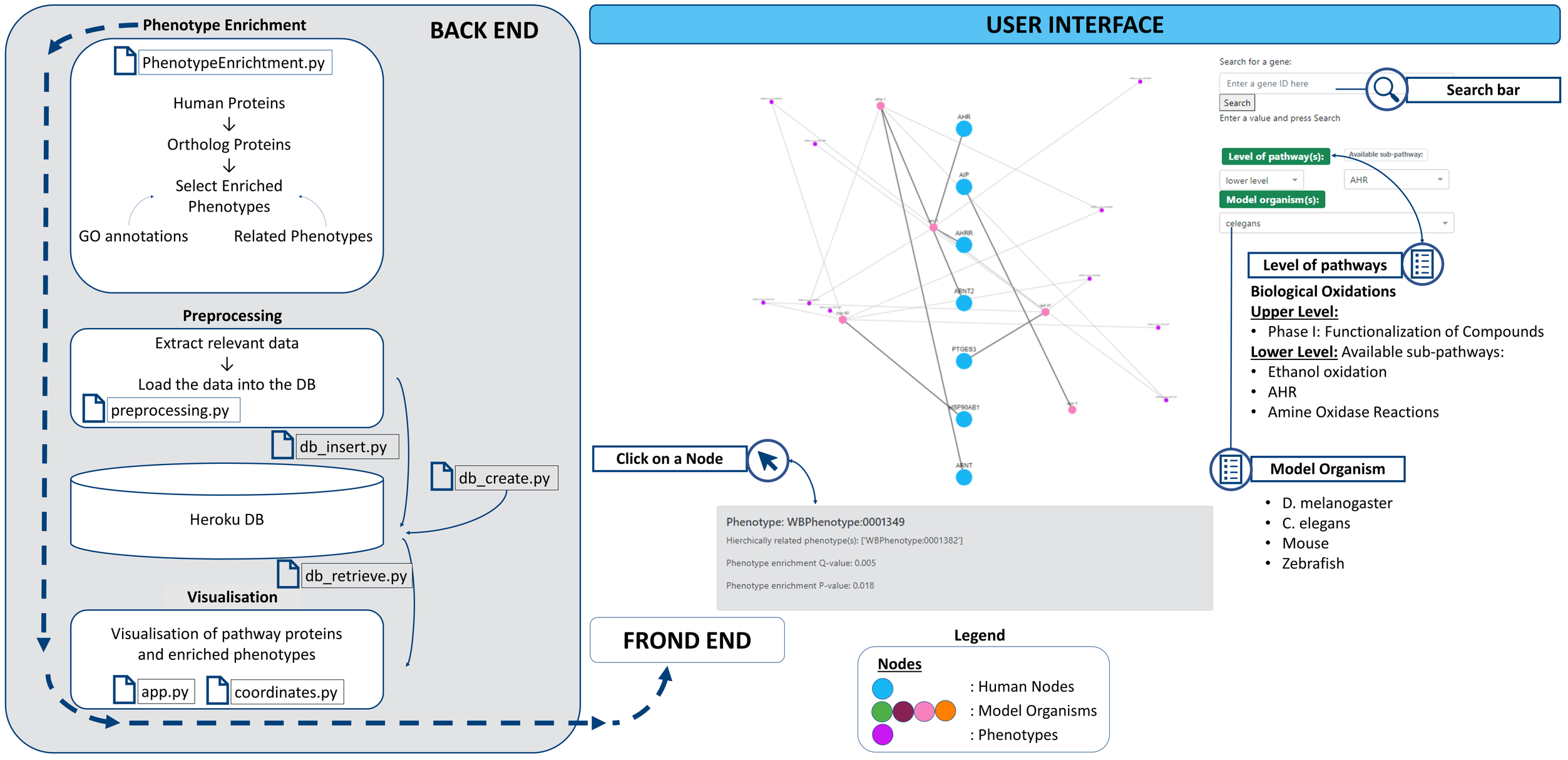
Preprocessing

- Extract human protein IDs to ortholog IDs and enriched phenotype IDs
- Link phenotypes with their function (GO annotations) and with other related phenotypes
- Link all IDs to their names

Visualization



Results



Conclusions

- **New tool** to **visualize phenotypic data** related to **human metabolic pathways** that can be negatively affected by various **chemical agents**
  - Can make **DART research cheaper and faster**
  - Can ensure that it is properly translated to people from the **model organisms**
- **Limitation of this tool:**
  - Large pathways have many nodes and are therefore difficult to understand

Future directions

- Upscaling → adding more pathways to our database
- Using graph database instead of a relational one
- Original code refactoring

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