Ricgraph

Tutorial Ricgraph - Research in context graph

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1 Tutorial Ricgraph - Research in context graph

1.1 Ricgraph introduction

Ricgraph, also known as Research in context graph, enables the exploration of researchers, teams, their results, collaborations, skills, projects, and the relations between these items.

Ricgraph can store many types of items into a single graph. These items can be obtained from various systems and from multiple organizations. Ricgraph facilitates reasoning about these items because it infers new relations between items, relations that are not present in any of the separate source systems. It is flexible and extensible, and can be adapted to new application areas.

In this tutorial, we explain the possibilities of Ricgraph. For a more detailed explanation, read the full documentation of Ricgraph on the documentation website https://docs.ricgraph.eu.

1.2 Motivation

Ricgraph is software that is about relations between items. These items can be collected from various source systems and from multiple organizations. We explain how Ricgraph works by applying it to the application area *research information.* We show the insights that can be obtained by combining information from various source systems, insight arising from new relations that are not present in each separate source system.

Research information is about anything related to research: research results, the persons in a research team, their collaborations, their skills, projects in which they have participated, as well as the relations between these entities. Examples of *research results* are publications, data sets, and software.

The following sections show three use cases that use different types of information (called *items*): researchers, skills, publications, etc. Most often, these types of information are not stored in one system, so the use cases may be difficult or time-consuming to answer. However, by using Ricgraph, these use cases (and many others) are easy to answer.

1.2.1 Use case for a journalist

As a journalist, I want to find researchers with a certain skill S and their publications, so that I can interview them for a newspaper article. Example skills can be: *climate change* or *stem cells.* The items surrounded by the red line are the solution to this use case.
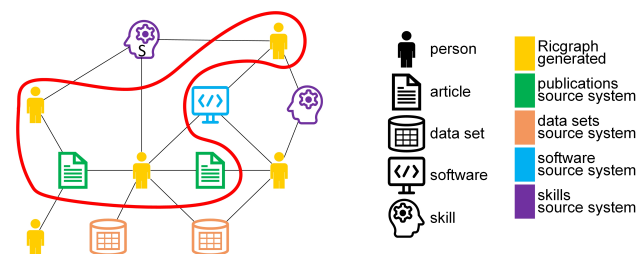

Figure 1.1: Ricgraph use case for a journalist.

1.2.2 Use case for a librarian

As a librarian, I want to enrich my local research information system with research results from person A that are in other systems (in orange, *RIS2*) but not in ours (in green, *RIS1*), so that we have a more complete view of research

at our university. The items surrounded by the red line are the solution to this use case.
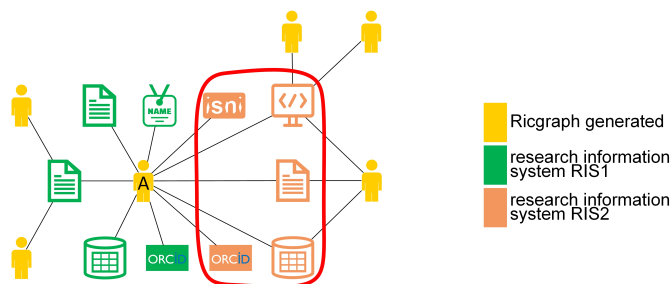

Figure 1.2: Ricgraph use case for a librarian.

1.2.3 Use case for a researcher

As a researcher A, I want to find researchers from other universities that have co-authored publications written by the co-authors of my own publications, so that I can read their publications to find out if we share common research interests. The items surrounded by the red line are the solution to this use case.
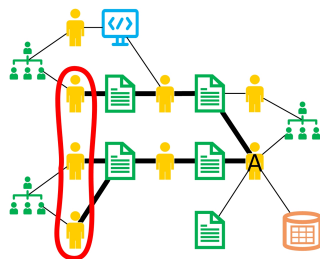

Figure 1.3: Ricgraph use case for a researcher.

1.3 Main contributions of Ricgraph

- Ricgraph can store many types of items in a single graph.
- Ricgraph harvests multiple source systems into a single graph.
- Ricgraph Explorer is the exploration tool for Ricgraph.
- Ricgraph facilitates reasoning about items because it infers new relations between items.
- Ricgraph can be tailored for an application area.
- Ricgraph has a REST API to programmatically get items from Ricgraph.

1.4 Installation guide

This section describes how to install both a graph database backend and Ricgraph on a Linux machine. For this, you will need to be able to change to user *root*. Read more about installing Ricgraph without the need to be able to change to user *root*, or about installing Ricgraph as a server on Linux.

1. Check the requirements.

2. Get the most recent Ricgraph Makefile. Type as regular user (i.e., be sure you are not user *root*):

   ```
   cd
   wget https://raw.githubusercontent.com/UtrechtUniversity/ricgraph/main/Makefile
   ```

3. Install Neo4j Community Edition. Only for this step you need to be user *root*. Type:

   ```
   sudo bash
   make install_enable_neo4j_community
   exit
   ```

   On success, the Makefile will print *installed successfully*.

4. Download and install Ricgraph in your home directory. Type as regular user (i.e., be sure you are not user *root*):

   ```
   make install_ricgraph_singleuser_neo4j_community
   ```

This is the tutorial for version 2.12 of Ricgraph – Research in context graph. Go to docs.ricgraph.eu for the full documentation. For more information about Ricgraph, Ricgraph Explorer, and the Ricgraph REST API, please read the reference publication doi.org/10.1016/j.softx.2024.101736, visit the website www.ricgraph.eu, or go to the GitHub repository github.com/UtrechtUniversity/ricgraph. 3

On success, the Makefile will print *installed successfully*.

5. For more detail, read Fast and recommended way to install Ricgraph for a single user. This is also a good place to start if you encounter errors.

6. Done.

1.5 Harvesting source systems

To be able to use Ricgraph, you will first need to harvest information. For some source systems, you need an authentication key. For some others, this is not necessary. To harvest two source systems in Ricgraph without the need for an authentication key, type:

```
cd $HOME/ricgraph_venv
make run_bash_script
```

This will harvest the data repository Yoda and the Research Software Directory. It will print a lot of output, and it will take a few minutes. When ready, it will print *Done*.

To read more about harvesting, see Ricgraph harvest scripts.

1.6 Browsing using Ricgraph Explorer

Ricgraph provides an exploration tool, so users do not need to learn a graph query language. This tool is called *Ricgraph Explorer*. As it is a Python Flask application, it can be customized as needed. New queries (buttons) can be added, or the user interface can be modified to fit a certain use case, user group, or application area.

Ricgraph Explorer has several pre-build queries tailored to this application area, each with its own button, for example:

- find a person, a (sub-)organization, a skill;
- when a person has been found, find its identities, skills, research results.

Ricgraph Explorer offers faceted navigation. That means, if a query results in a table with e.g. *journal articles*, *data sets*, and *software*, you can narrow down on one or more of these categories by checking or unchecking their corresponding checkbox. An alternative view uses tabbed navigation.

This section describes some possibilities of Ricgraph Explorer. For a more extensive description, read Ricgraph Explorer.

Start Ricgraph Explorer to browse the information harvested:

```
cd $HOME/ricgraph_venv
make run_ricgraph_explorer
```

The Makefile will tell you to go to your web browser, and go to http://127.0.0.1:3030.

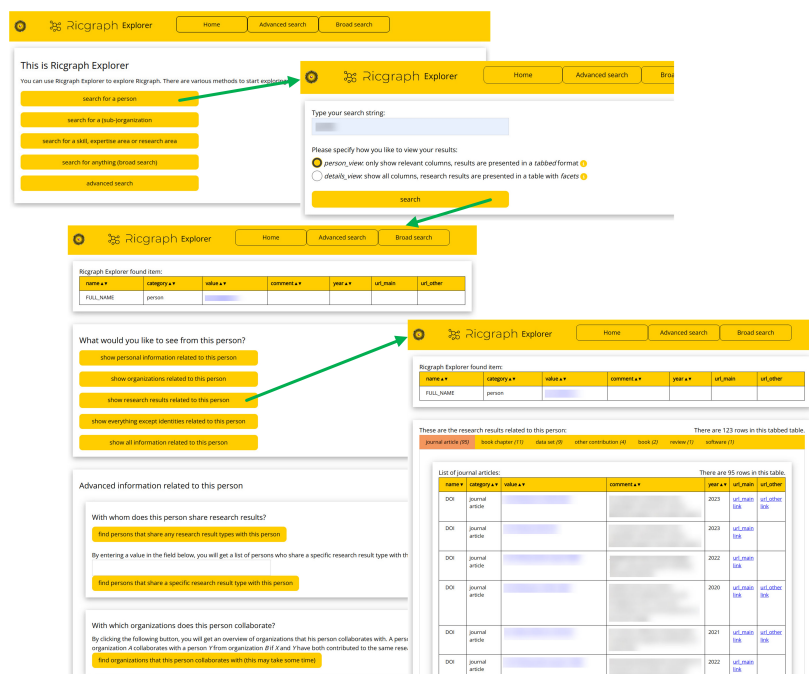### 1.6.1 A usage flow through Ricgraph Explorer

Figure 1.4: Screenshots of a usage flow through Ricgraph Explorer. Some field values have been blurred for privacy reasons.

The figure above shows screenshots of web pages of Ricgraph Explorer for answering the research question "What are the research results of person A".

The screenshot at the top left is the home page. After clicking "search for a person", Ricgraph Explorer shows a search page (top right). A user types a name, and the person options page is shown (bottom left). After clicking "show research results related to this person", the results page is shown (bottom right). In that page, the rows in the second table are (in this case) the journal article neighbors of the item in the first table (the person the user searched). This person also has other types of research results: book chap-

ters, data sets, other contributions, books, reviews, and software (cf. row with orange rectangle, this is an example of the tabbed navigation). The "comment" column contains the titles of the journal articles. By clicking on an entry in the "value" column, in this case a DOI value, the user will go to this neighbor. Ricgraph Explorer will show a page with persons who have contributed to that journal article.

1.6.2 Example research questions

In the figure in the previous section, after a click on a value in the "value" column in the bottom right result page, the user will get the persons who have contributed to that research result, as in figure (b) below.
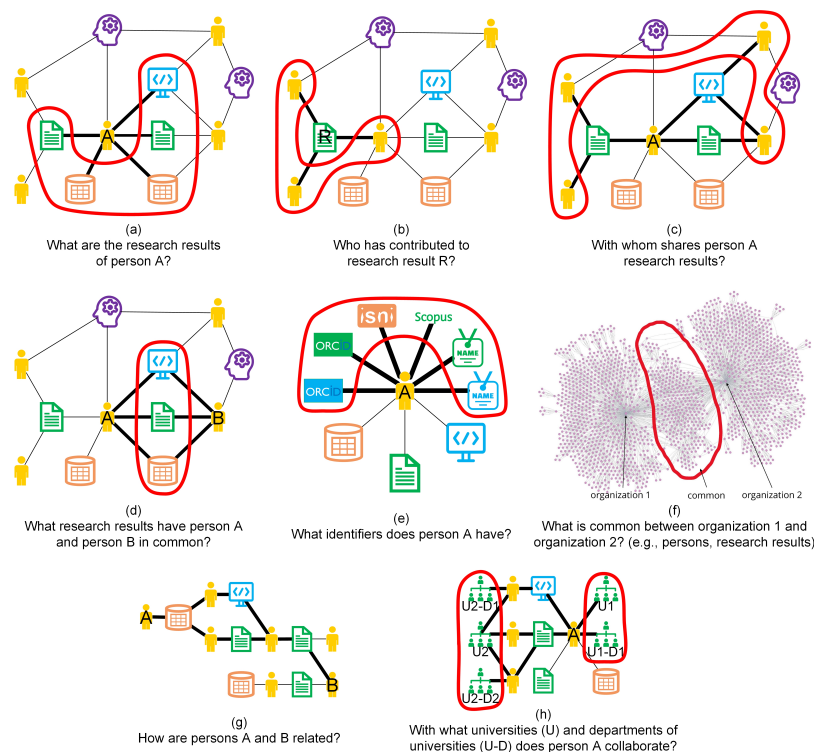
Figure 1.5: Example research questions for Ricgraph.

Clicking "find persons that share any result types with this person" in the bottom left person option page (in the figure in the previous section) corresponds to figure (c), and clicking "show personal information related to this person" corresponds to figure (e).

The research question "What are the research results of person A" from the previous section corresponds to figure (a).

1.7 More information

- Read the full documentation of Ricgraph on https://docs.ricgraph.eu.
- For a gentle introduction in Ricgraph, read the reference publication: Rik D.T. Janssen (2024). Ricgraph: A flexible and extensible graph to explore research in context from various systems. *SoftwareX*, 26(101736). https://doi.org/10.1016/j.softx.2024.101736.
- Read more about publications, presentations, newsletters, projects with students, use, and mentions of Ricgraph.

1.8 Contact

Ricgraph has been created and is being maintained by Rik D.T. Janssen from Utrecht University in the Netherlands. You can find contact details at his Utrecht University employee page. He also has an ORCID profile on ORCID 0000-0001-9510-0802. You can contact him for presentations, demos and workshops.

He is also very interested in working together on projects involving Ricgraph. Ricgraph is a flexible platform that brings together information from multiple systems into a single graph. It allows users to analyze this information and explore how it relates to other types of information. We could work together on use cases applying Ricgraph to research information, such as exploring collaborations or analyzing how people or organizations contribute to research results. We could also explore entirely different domains. Any application that involves representing and analyzing interconnected information as nodes and relations in a graph, regardless of the field, is of interest.

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