CNATool - User Manual

Presentation

The **CNATool** tool was developed, using the **MaiaScript** programming language, to allow quick and simplified analysis of complex network graphics from any device connected to the Internet.

Currently the tool allows:

* Display the network graph.
* Define the graph layout algorithm.
* Calculate basic graph properties: average degree, density, average clustering coefficient, average shortest path, diameter and graph efficiency.
* View detailed vertices' properties: degree, clustering coefficient and centralities.
* Save graph in **Pajek** and **JSON** format.
* Export graph in **SVG** format.
* Save a summary of the graph properties in **HTML** format.

Knowing the user interface

The CNATool interface is divided into three parts: **menu bar**, **properties panel** and **graph display panel**.

Menu bar

The menu bar allows access to all application's functionalities. Currently it presents **Maia**, **File**, **View** and **Help** options. Figure 1 presents the options found in the main menu of the program.



Figure 1: Menu bar.

The option **Maia** directs the browser to the **Maia Cloud Lab** site, the virtual lab of the **Maia Research Group**, responsible for the development of this program.

The **File** option allows access to operations related to creating, opening and saving files. It contains three submenus: **New**, **Open** and **Save**. The **New** option allows you to create a graph from some parameters that will be requested. The parameters are **number of vertices**, **number of edges**, **edge probability** and **average degree**. Of these, the only mandatory parameter is the **number of vertices**. The other parameters can be requested or not, depending on the topology of the graph to be created. The types of graphs supported are **complete**, **random**, **scale-free**, **small world** and **hybrid**. Figure 2 presents this menu with all its options expanded.



Figure 2: File, New menu option.

As an example, let us create a **scale-free** graph. To do this, the following actions should be performed:

1. Position the mouse pointer over the **File** menu.
2. Move the mouse pointer to the **New** option.
3. Click on the **Scale-Free Graph** option.
4. Enter 20 in the **Number of vertices** dialog box.
5. Type 2 in the **Average degree** dialog box.
6. Enter 0.3 in the **Edge probability** dialog box.

A graph like the one shown in Figure 3 will be created. This graph was created randomly, and its layout is also random. We can modify this by selecting a **layout algorithm** in the **properties panel**. Figure 4 shows the properties panel and highlights the **Force Atlas 2** option. Click on this option. The algorithm will begin to rearrange the vertices of the graph. When it stabilizes, select **None** from the same menu. Figure 5 shows the graph of Figure 3 rearranged using the **Force Atlas 2** algorithm.

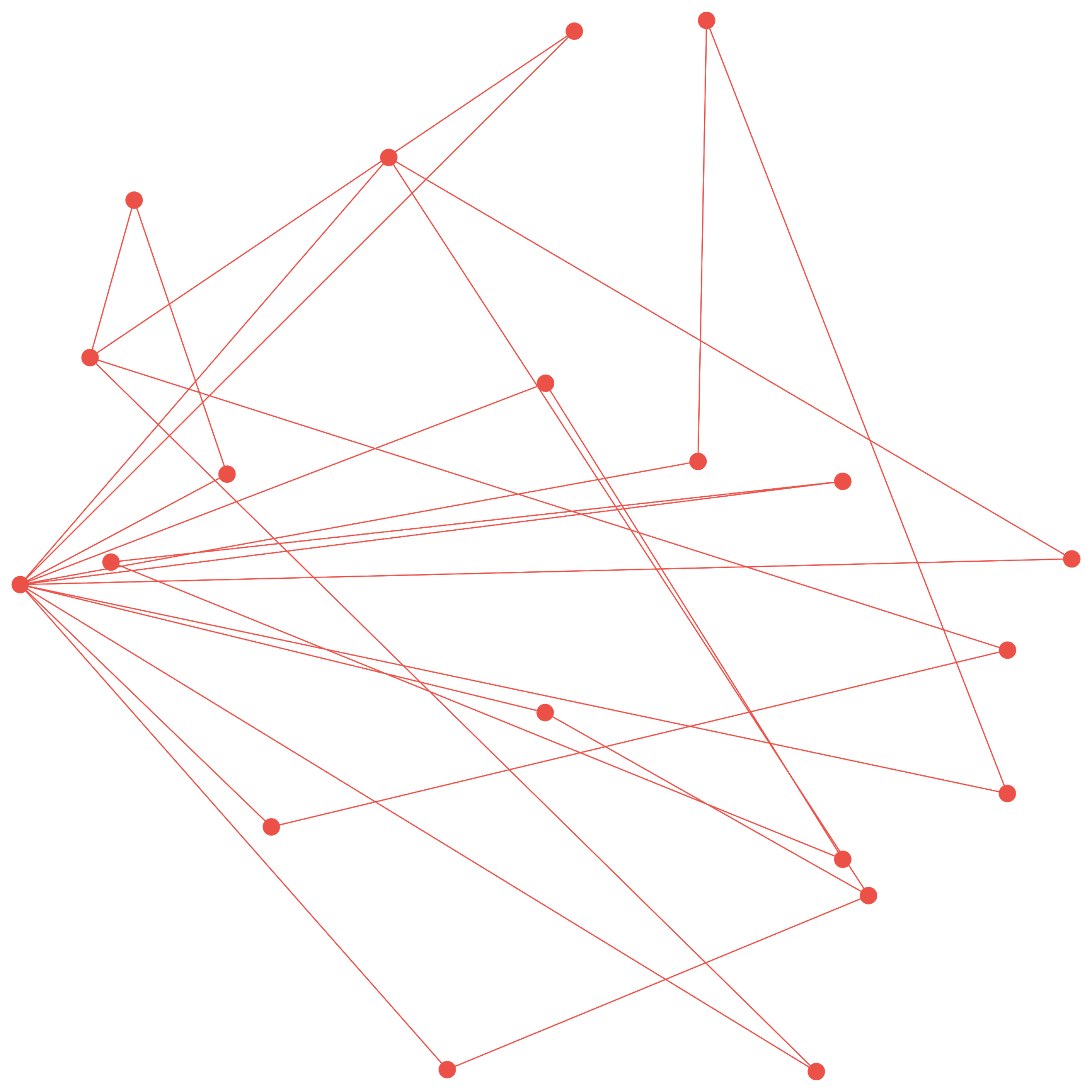


Figure 3: A free scale graph.

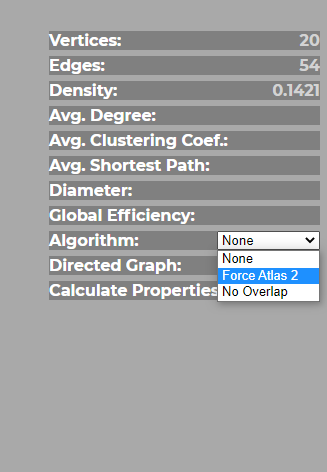


Figure 4: Properties panel highlighting the Force Atlas 2 option.

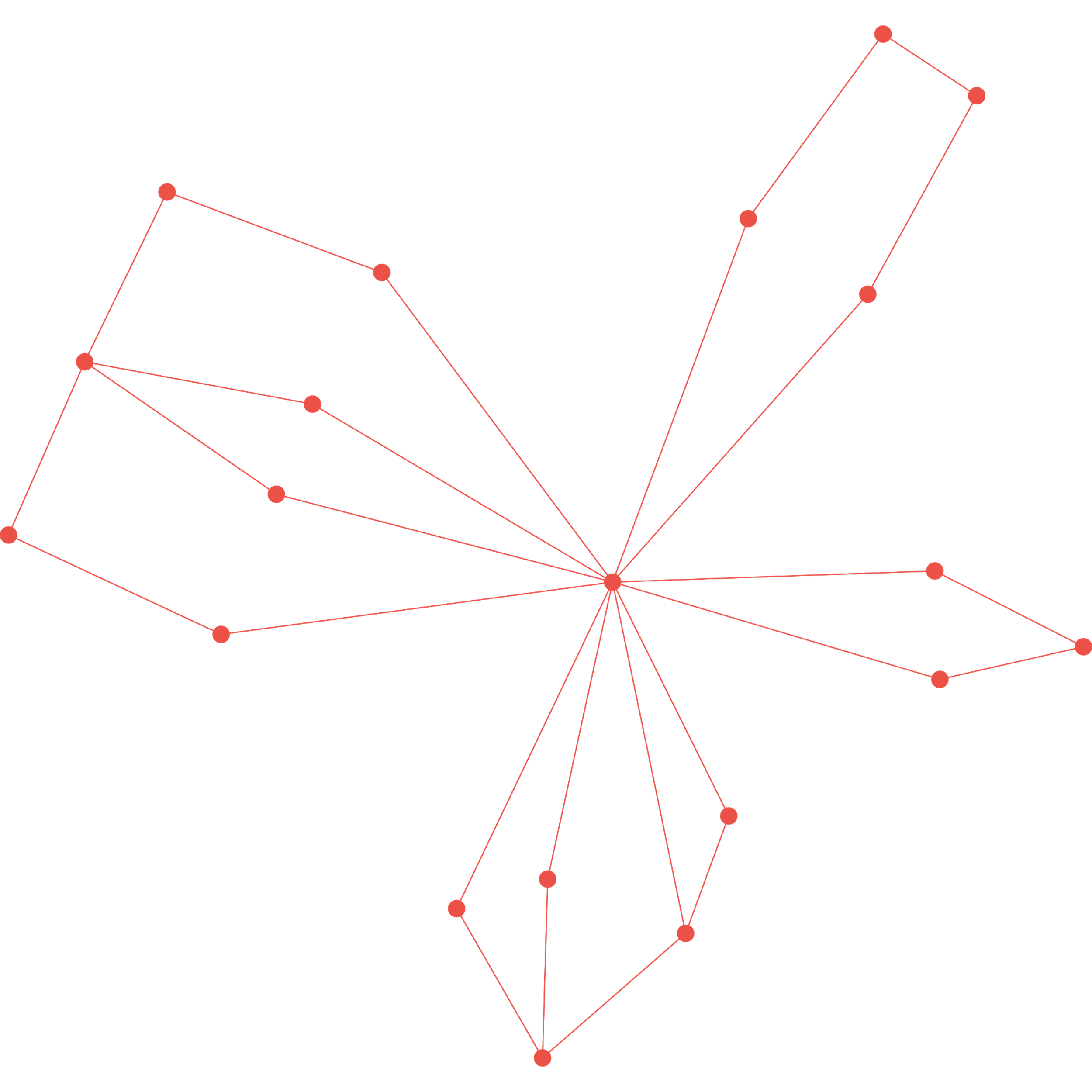


Figure 5: The graph of Figure 3 reorganized using the Force Atlas 2 algorithm.

The **Open** option in the **File** menu allows you to open files in **Pajek** and **JSON** formats. The program automatically identifies the file format based on its file name extension. These extensions are **NET** and **JSON**, respectively.

The menu **Save** allows you to save the graph in the **Pajek**, **JSON** or **SVG** (**Graph File)** file formats. Regardless of the chosen format, the applied layout will be saved in the file.  
  
The **File**, **Save**, **Report file** option allows you to save a report containing the properties displayed in the properties panel. This report also contains the **degree distribution** of the graph. To do so, you must first check the **Calculate Properties** option in the properties panel.  
  
The **View** menu allows you to view the graph properties in detail. This menu presents the options: **Properties Summary**, **Vertices Degrees**, **Vertices Clustering** and **Vertices Centralities**. To use any option in this menu, it is necessary first calculate the properties of the graph. To do so, check the **Calculate Properties** option in the properties panel.

Legal information

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