

# User Manual

## Catalogue

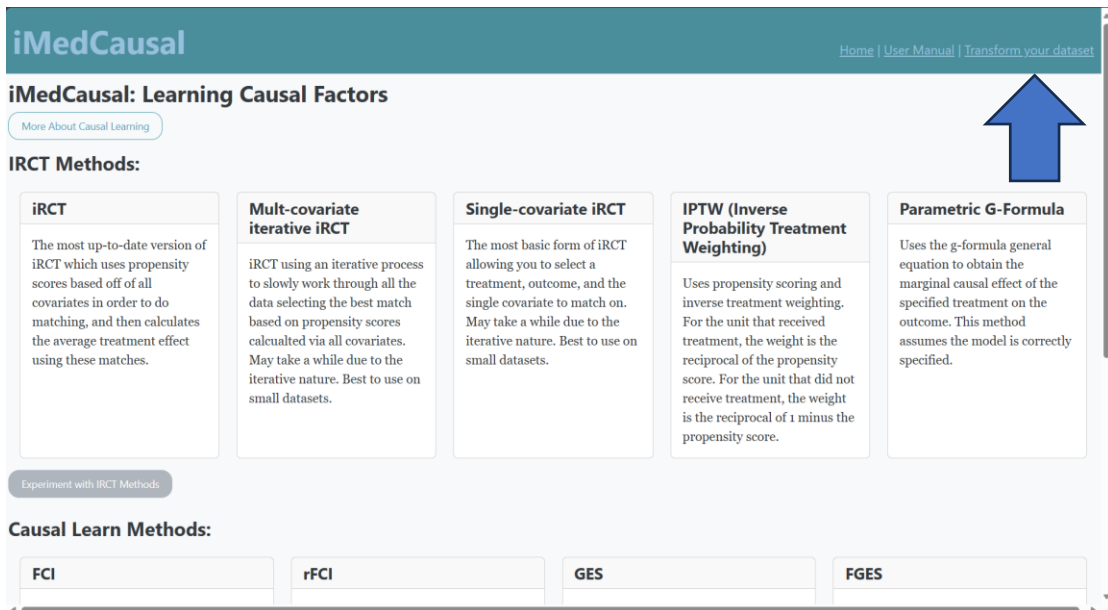
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## Background

The authors of this report predict that causal inference will continue to be a major research imperative of Artificial Intelligence. In many cases, we are interested in knowing the causal risk factors of a chosen target. For examples, in medicine, we would be interested in knowing the causal risk factors for breast cancer metastasis; In biomedicine, we would be interested in knowing the genetic risk factors that are directly responsible for Alzheimer’s disease; in clinical practice, we would be interested in knowing the treatment effect of a new drug on a particular disease. Note that cause and causal effect (the treatment effect in my occasions) go side by side. We have many existing machine learning methods that can help learn associations/correlations/dependencies between some factors and a chosen target, which is often called a class feature in machine learning, but those factors are not causal and may not have a causal influence on the chosen target. Learning the causal factors of a chosen target from data is a state-of-the-art approach for understanding the causal mechanisms, helping improve personalized prediction of the chosen target and conduct intervention efficiently and effectively. In this category of our iMedCausal, we are currently including four methods for learning causal factors to a chosen target, while in the meantime we will continue to develop new methods on our own and search for other existing methods, to be included.

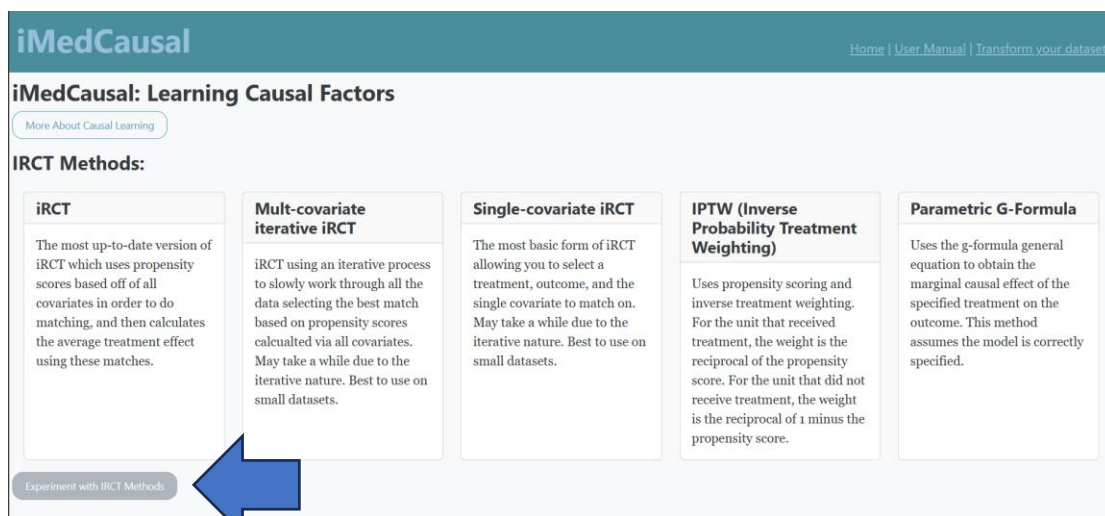
## How to use this website

1. You can choose to use iRCT, MBIL, or Causal Learning function according to your requirement. However, there are few conditions you must fulfill before using the services.
2. Each method will have certain dataset requirements. If your dataset needs to be transformed to meet these requirements, you can click Transform your dataset in the top right



The screenshot shows the iMedCausal website interface. At the top, there is a navigation bar with links for Home, User Manual, and Transform your dataset. Below this, the main heading is 'iMedCausal: Learning Causal Factors'. A blue arrow points to the 'Transform your dataset' link. The page is divided into two main sections: 'IRCT Methods:' and 'Causal Learn Methods:'. The 'IRCT Methods:' section contains five cards: 'iRCT', 'Mult-covariate iterative iRCT', 'Single-covariate iRCT', 'IPTW (Inverse Probability Treatment Weighting)', and 'Parametric G-Formula'. The 'Causal Learn Methods:' section contains four cards: 'FCI', 'rFCI', 'GES', and 'FGES'. A button labeled 'Experiment with IRCT Methods' is located below the IRCT cards.

3. iRCT
  - Whatever your treatment column is, it must be **binary** in values(0 and 1).
  - The currently accepted file formats are: txt, csv, xlsx, and dat
  - Using certain functions on your dataset might cause errors or not work, if it does not work it will kick back to the original page



This screenshot is similar to the one above, showing the iMedCausal website interface. A blue arrow points to the 'Experiment with IRCT Methods' button located below the IRCT cards.

4. Causal Learning


- Categorical and Numerical data are both acceptable.
- The currently accepted file formats are: txt, csv, xlsx, and dat

Experiment with IRCT Methods

**Causal Learn Methods:**

<p><b>FCI</b></p> <p>FCI (Fast Causal Inference) is an algorithm designed to be find causal relationships between variables in directed acyclic graphs. This iteration outputs a png of the causal graph.</p>	<p><b>rFCI</b></p> <p>rFCI is an iteration of FCI, which has been adjusted for improvements in runtime. FCI is an algorithm with polynomial complexity, leading to excessive runtimes with larger quantities of nodes. rFCI speeds up this process, but as a result provides less information.</p>	<p><b>GES</b></p> <p>GES(Greedy Equivalence Search Architecture) is an algorithm with similar goals to FCI, however it begins with a completely empty graph instead of a full graph and adds edges as needed. The GES graph is known to have some issues finding confounding variables, however it is generally a better starting place for many datasets.</p>	<p><b>FGES</b></p> <p>FGES is another iteration of GES, and shares a similar relationship to GES as rFCI does to FCI. FGES is a faster and more optimized version of GES that is ideal for sparser graphs.</p>
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Experiment with Causal Learn Methods



## 5. MBIL

- Categorical and Numerical data are both acceptable
- The currently accepted file formats are: txt, csv, xlsx, and dat

Dataset File

Choose File No file chosen

Data Separator

Choose...

Target Column

Choose...

Alpha 1 ?

ex: 240.0

Alpha 2 ?

ex: 240.0


Max Parents ?

ex: 7

Max Single Predictors ?

ex: 20

Max Graph Length ?



- Form is disabled until file is chosen, make sure to start with this


Dataset File  
 COVID3\_4Nodes3.txt

Data Separator

Target Column

Alpha 1 <sup>?</sup>

Alpha 2 <sup>?</sup>



- After file is selected, the separator must be selected. If your file is large, choosing the separator may lag for a second as the table is rendered. If your table shows up as one column, you have selected the wrong separator. This may take time so please be **patient**.

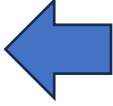
Max Single Predictors <sup>?</sup>

Max Set Length <sup>?</sup>

Max Number of Interactions Reported <sup>?</sup>

Threshold <sup>?</sup>

Generate Log File



- Once this loads, you will be able to fill out the rest of the form and submit the form.

6. Please follow the rules above. If your data type does not fulfill its requirement, you could transform your data by the “Transform your dataset” page. The hyper link button is at the upper right-hand corner, beside the home button.