Research Methods in computer science
Spring 2023

Lecture 15

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Agenda

Conference updates

Adequate descriptions of systems

HW7

The Body of the paper

Depending on the area of work may describe the proposed algorithm, proofs, systems, implementations

[slide from a while ago...]

How much details?

Ideally: Enough for someone to replicate your system or idea

Practical consideration: 1-2 pages.

Illustrations

"One picture is worth a thousand words"

Architecture

Data flow

Try to have 1-2 diagrams describing your system

Code and Data Release

Becoming common in many areas of CS

Important tool for reproducible research

Code and data is not adequate.

Lots of code and data but impossible to understand artifacts

How much details should we use to describe experiments?

Same consideration as describing your system.

Consequences of inadequate clarity

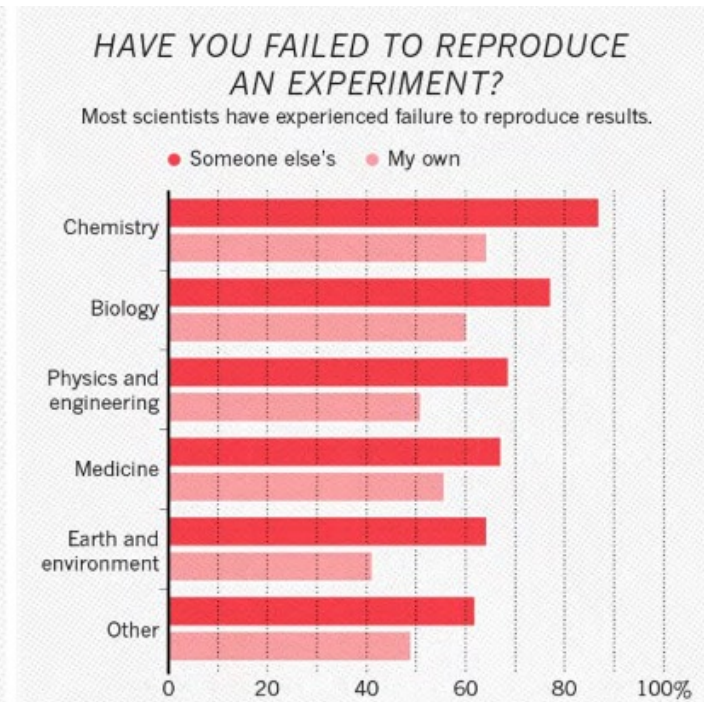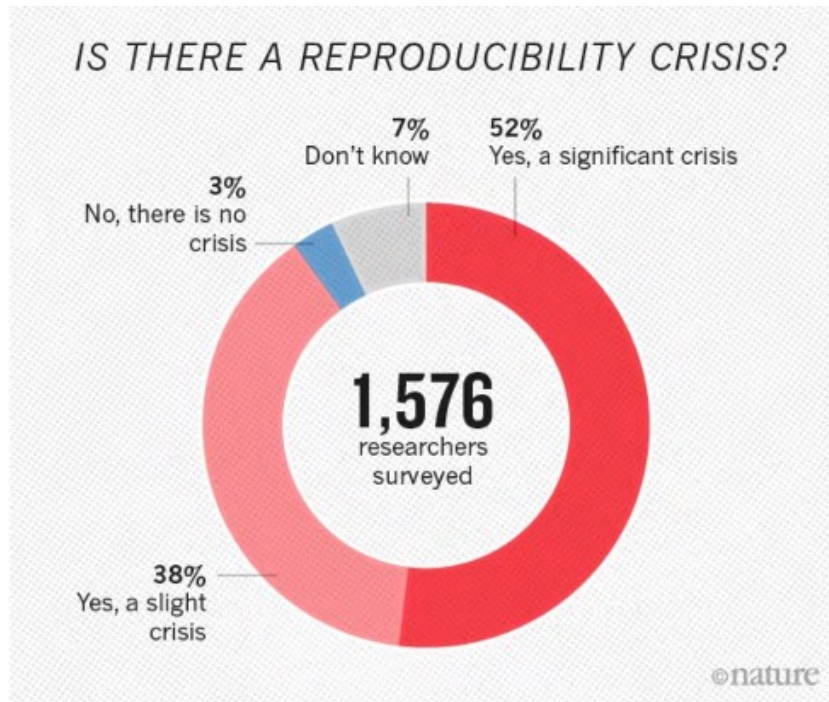An experiment writeup that can be interpreted as proving humans are faster than a car

Adequate Descriptions

AI/ML

Reproducibility

Reproducibility - 1

https://blog.ml.cmu.edu/2020/08/31/5-reproducibility/

Reproducibility - 2

1. We need to have a clear description of the algorithm along with the complexity analysis (space, time, sample size). Sample size becomes important in case of an independent replication study.

2. We need to include links to downloadable source code and dataset along with the dependencies.

3. We need to provide a clear description about the data collection process, and how samples were allocated for training, testing, and validation.

4. We need to specify the range of the hyperparameters considered and the method employed to select the best hyperparameters. Finally, we need to have a specification of the hyperparameters.

5. We need to include a clear definition of statistics used to report the results, description of results including central tendency, variance, error bars as well as number of evaluation runs.

6. We also need to include the computing infrastructure used.

https://blog.ml.cmu.edu/2020/08/31/5-reproducibility/

Adequate Descriptions

Systems

Design and implementation

Experiment setup

Metrics

Class Activity

Pick a paper

Determine if the system or experiment has adequate details.

Can you reproduce the results there?
Why is this question important?

HW7

Related Work

The ten papers

Additional papers

Organizational elements