Teaching "Responsible Data Science"

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DATA 620: Ethics in Data and Computing

Required for students in:

- MS Data Science (2020)
- MS Applied Mathematics (2022)
- MS Computer Science (2022)

Prerequisite for thesis and fieldwork

NYU's Responsible Data Science course

Created by Julia Stoyanovich (NYU Associate Professor of Data Science, Computer Science and Engineering)

With involvement from George Wood (NYU Moore-Sloan Faculty Fellow, Center for Data Science)

Ethics course for techies

- Rigorous mathematics - yes, really!
- Python Jupyter notebooks running state of the art packages

But also-

- Social Science
- Philosophy
- Management
- Legal issues
Sample materials

The evils of discrimination

**Disparate treatment**

is the illegal practice of treating an entity, such as a job applicant or an employee, differently based on a **protected characteristic** such as race, gender, age, disability status, religion, sexual orientation, or national origin.

**Disparate impact**

is the result of systematic disparate treatment, where disproportionate **adverse impact** is observed on members of a **protected class**.

We can even plot the mutual information between all pairs of features in the dataset:

```python
[]

attribute_description - read_json_file(description_files['correlated attribute mode'])['attribute_description']

ModelInspector(real_data, synthetic_correlated, attribute_description).mutual_information_heatmap()
```

**Pairwise Mutual Information Comparison (Private vs Synthetic)**

**Private, max=1**

**Synthetic, max=1**
Course outline

1. Fairness
   - Sociotechnical systems; Stakeholders; Trade-offs
   - Fairness in classification; Fairness in risk assessment
   - Causality; Counterfactual fairness
   - Philosophy of fairness

2. Data Science Lifecycle
   - Data profiling and cleaning
   - Taming technical bias

3. Data Protection
   - Limits of anonymization
   - Differential privacy; Synthetic data
   - Applied Ethics; Ethical frameworks

4. Transparency and Interpretability
   - Auditing black-box models
   - Explainable machine learning
   - Online ad delivery
   - Legal frameworks

Materials available (by request)

- Week by week reading list
- Lecture slides
- Lab activities
- Homework assignments and solutions
- Final project or paper instructions
Resources

- Spring 2022 Responsible Data Science course website: https://dataresponsibly.github.io/rds/
- Journal article: https://rdcu.be/cS0h6


- Light-ish background reading: The Ethical Algorithm by Michael Kearns & Aaron Roth
- dyuster@ramapo.edu and/or stoyanovich@nyu.edu