Feature Selection for Discovering Distributional Treatment Effect Modifiers

Paper ID **61**

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Q. *Treatment effects are different across individuals.* ***Why?***

Treatment

e.g., vaccination, education program

Outcome

e.g., immunity, grades

: Harmed

: No effect

: Benefited

A. Find **features** related to *treatment effect heterogeneity !*

Input: Observational Data

X_1	...	X_d	A	Y	Y^1	Y^0	$Y^1 - Y^0$
Male		15 y.o.	0	82	?	82	?
Male		80 y.o.	0	174	?	174	?
Female		64 y.o.	1	135	135	?	?
Female		32 y.o.	1	110	110	?	?

Output: Features related to *treatment effect heterogeneity*

X_2 X_5 X_9

$p = 0.002$ $p = 0.019$ $p = 0.035$

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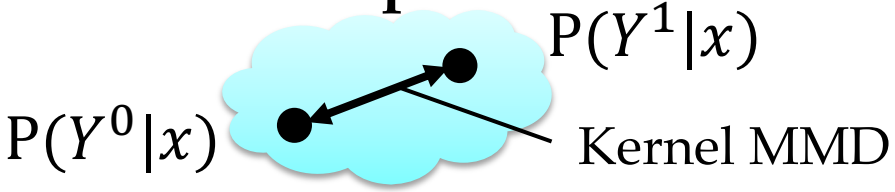
Goal: Discover a **wider** variety of treatment effect modifiers
Proposal: Detect features related to *distributional* treatment effects

1. Feature importance measure

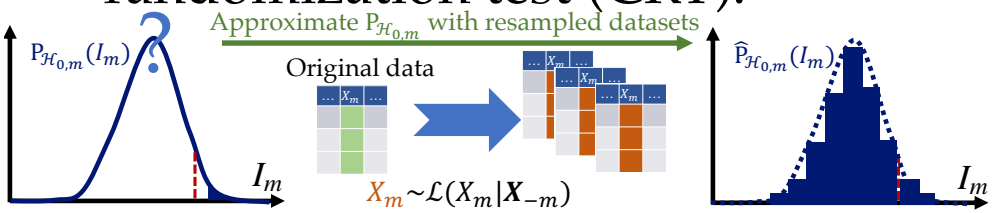


2. Its efficient estimator

IPW + RFFs

3. Feature selection algorithm

Multiple tests with conditional randomization test (CRT):



Results

Synthetic data:

High TPR while controlling FPR

Health record dataset (NHANES):

Feature	Adjusted p-value
Age	0.0075 ± 0.0305
Gender	0.0046 ± 0.0269
Number of cigarettes smoked	0.0 ± 0.0

Not detected by the existing method