HUDK 4051: LEARNING ANALYTICS: PROCESS & THEORY

3/30/17 8:41 AM

In the news

S.J.Res.34 - A joint resolution providing for congressional disapproval under chapter 8 of title 5, United States Code, of the rule submitted by the Federal Communications Commission relating to "Protecting the Privacy of Customers of Broadband and Other Telecommunications Services".

115th Congress (2017-2018)

Search Internet History Donate https://searchinternethistory.com/#donate gofundme

Handcuffing Cities to Help Telecom Giants

MN SF561 | 2017-2018 | 90th Legislature

Minnesota Senate Bill 561

MN State Legislature page for SF561

With IRS Data Tool Down, Lawmakers Ask Education Dept. to Help Students

THE CHRONICLE OF HIGHER EDUCATION

Facial recognition database used by FBI is out of control, House committee hears

theguardian

Sorry, but your AI needs to go back to school

VB

Can a Machine Predict Your Death?

Slate

SCIENTIFIC AMERICAN

Will Democracy Survive Big Data and Artificial Intelligence?

PR Newswire a CISION company

The French Ministry of Education Partners with Canadian-based Ed Tech Company, Vretta, to Deploy Large-Scale Interactive Assessments

INSIDE HIGHER ED

Ed + Tech = :)

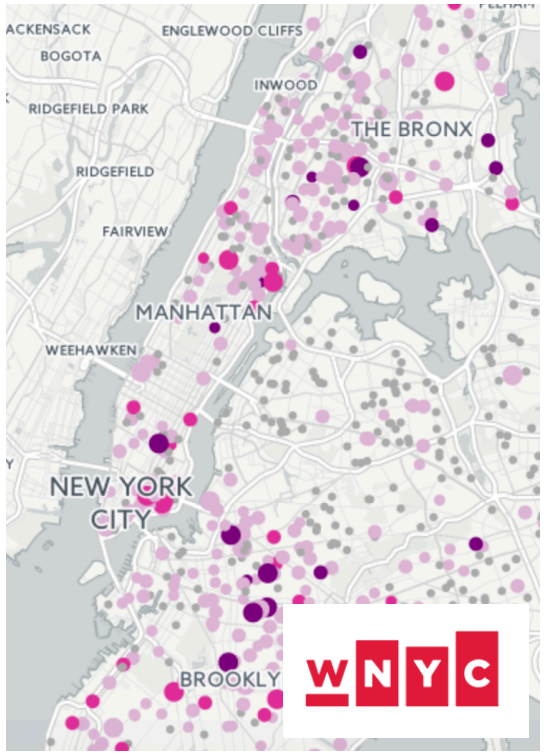
NIGERIAN TRIBUNE Since 1949 Nigeria's Most Informative Newspaper

recode

SoundCloud gets a $70 million lifeline

A new debt round.

Lack of reliable data hampers quality education delivery— FG



Events

March 30 Big Data: Understanding Algorithmic Power (https://law.wlu.edu/centers/lewis-law-center/events/big-data-discrimination)
(Washington & Lee Law)

March 31 Seeing is Deceiving: Media Artists on the Limits and Possibilities of Human and Computer Vision (http://events.nyu.edu/#!event_id/149326/view/event)
(NYU)

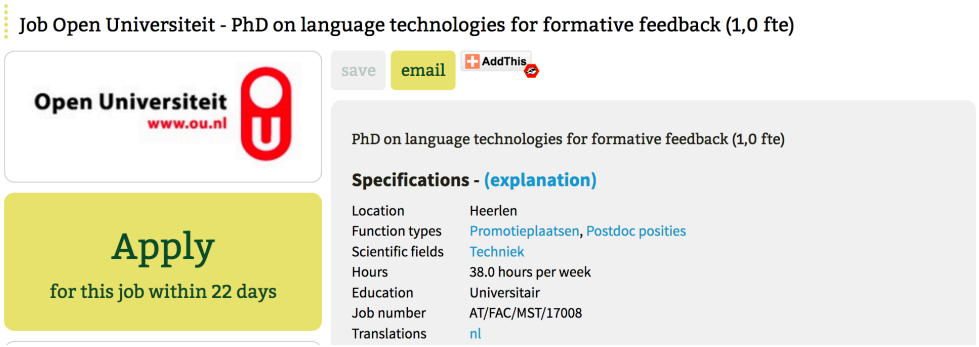
April 5 Data Science Day (https://www.eventbrite.com/e/data-science-day-columbia-university-2017-tickets-31322579679)
(Columbia University Data Science Institute)

April 6 Giving Voice: Mobile Communication, Disability, and Inequality (https://www.eventbrite.com/e/giving-voice-mobile-communication-disability-and-inequality-a-small-group-session-with-dr-meryl-tickets-33012414019)
(Data & Society)

April 7-8 International Workshop on Obfuscation (http://www.obfuscationworkshop.io/schedule/) (NYU)

April 7-8 Theorizing the Web (http://theorizingtheweb.tumblr.com/2017/program) (Museum of the Moving Image)

PhD Programs



Job Open Universiteit - PhD on language technologies for formative feedback (1,0 fte)

Open Universiteit
www.ou.nl

Apply
for this job within 22 days

save email AddThis

PhD on language technologies for formative feedback (1,0 fte)

Specifications - (explanation)

Location	Heerlen
Function types	Promotieplaatsen, Postdoc posities
Scientific fields	Techniek
Hours	38.0 hours per week
Education	Universitair
Job number	AT/FAC/MST/17008
Translations	nl

University of Technology Sydney • Connected Intelligence Centre • https://utscic.edu.au

UTS:CIC is a dynamic innovation centre created to impact UTS with the benefits of analytics and data science. We are offering full Scholarships to undertake a PhD in a Learning Analytics.

Please visit the PhD site https://utscic.edu.au/research/phd to review the PhD projects we are offering, the research environment we provide, and contact the supervisors directly to open a conversation.

Learning Analytics Across Digital and Physical Spaces

Learning Analytics for Writing Practices

Human-Centred Design for Learning Analytics

Debate Visualisation & Analytics

Experimental Design

Definitions

Random

- Not haphazard
- Conditional complexity is maximal between x & y is maximal (Kolmogorov)
- There is no relationship between x & y

Definitions

Random variable

- A variable whose possible values are numerical outcomes of a random phenomenon

Stochastic Process

- Involving, in some way, randomness

Law of Large Numbers

- Over a large number of trials the result of the same experiment will converge on the average result
- Therefore, extraneous factors will equalize if we sample enough (reduce bias)
- R example#

Gerolamo Cardano (1501-76)

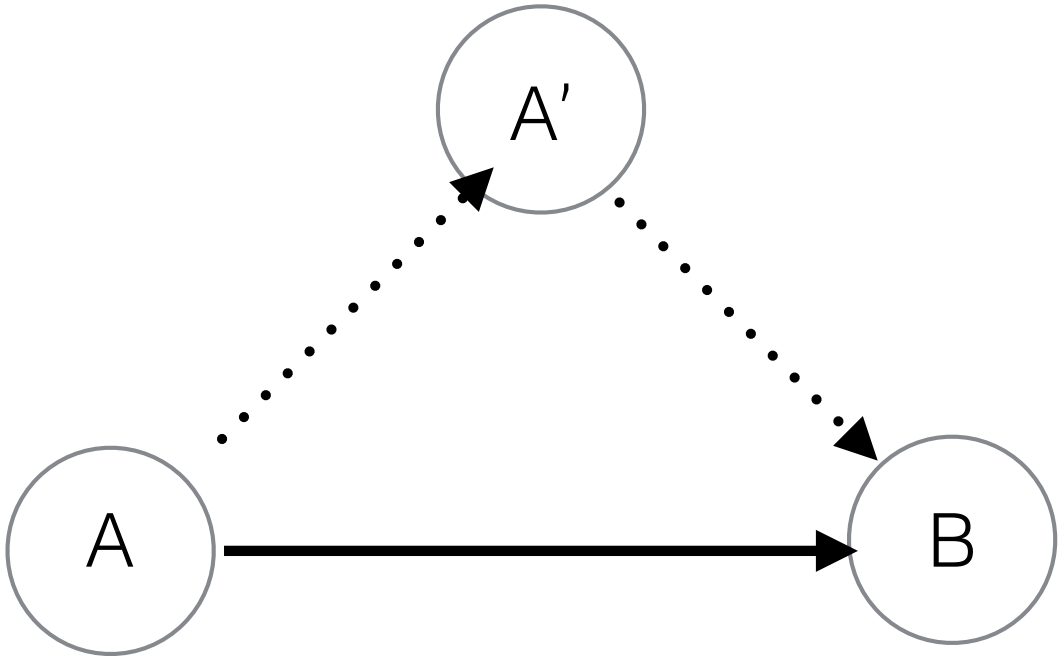
Generating Random Numbers

- Cannot be reasonably predicted better than by random chance
- Statistical randomness: contains no recognizable patterns or regularities
- No true random number generator
- Physical randomness[#] (rate limited)
- Algorithmic randomness (pseudo-random)
    - R: Mersenne Twister (624)
    - Seed[#]

Validity

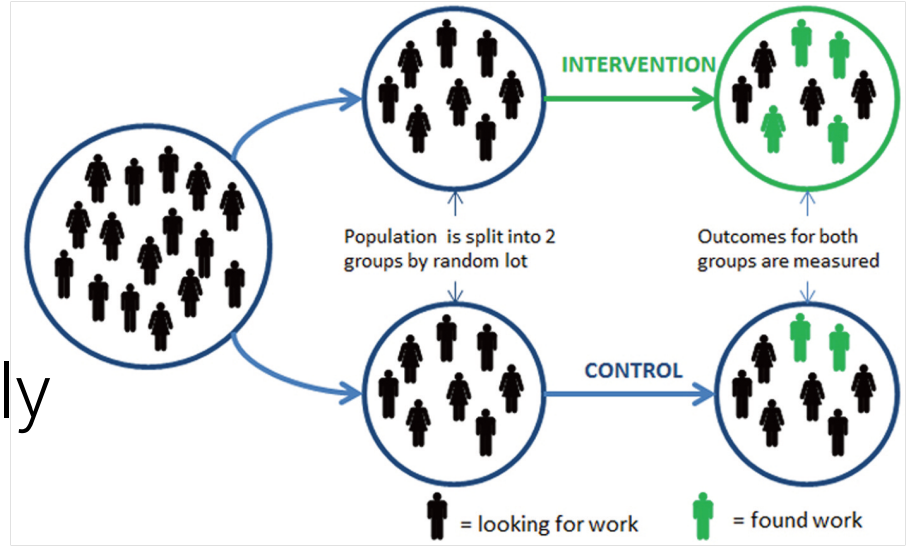
- Internal Validity: reduce systematic bias
- External Validity: generalizability

Extraneous Variables



Randomized Controlled Trials

- Gold Standard***
- Random allocation of subjects to treatment/ control
- All groups are treated equally except for manipulation
- Estimate the size of the difference between groups



Causality

- No universal definition
- Several schools of thought:
  - Standard (cause & effect)
  - Transitive
  - Probabilistic
  - Counterfactual
  - Manipulative
  - Structural
  - Expressive
- Meaning is very unclear for latent variables

Statistical Power

- Weighing type I (false positive) and type II (false negative) error
- Is a compromise between:
  - Sample size
  - Effect size
  - Significance (probability of false positive)
  - Power (probability of finding an effect that is there)
- Many ways to calculate and several software implementations
- Depends on the statistical test
- In R: pwr, GUI: G*Power

Randomized Controlled Trials

Asterisks *****

- Researcher bias: *Double Blind*: researchers and subjects do not know who is which group
- Attrition/Noncompliance: *Intent to treat*: test whether the opportunity of treatment makes a difference
- Ethical considerations: Is it ethical to differentially treat students?
- Contamination: treatment and control share
- Practical considerations: cost, administrative burden, compliance, level of treatment, trends

Assistments

ASSISTments: As a researcher's tool

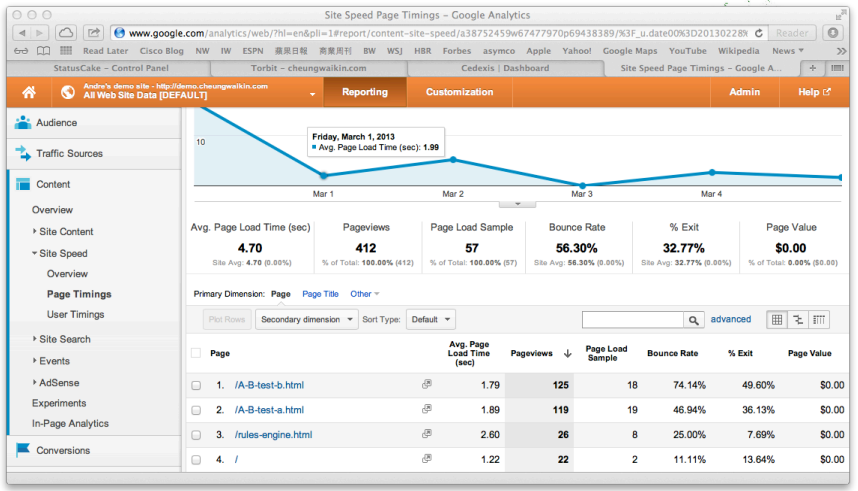
https://sites.google.com/site/assistmentsstudies/home

- +20 RCTs
- System for researchers to easily manipulate the platform and randomly allocate to a pool of 1000s
- Infrastructure to do meta-analysis

A/B Testing

- Two sample hypothesis testing
- Randomly allocate to one of two conditions
- Limited control over conditions
- Not generalizable
- Often fine because not looking for causal agents
- BUT still want to know if due to chance
- Usually requires very concrete outcomes
- Two clear options are rare

William Gosset
(1876 -1937)

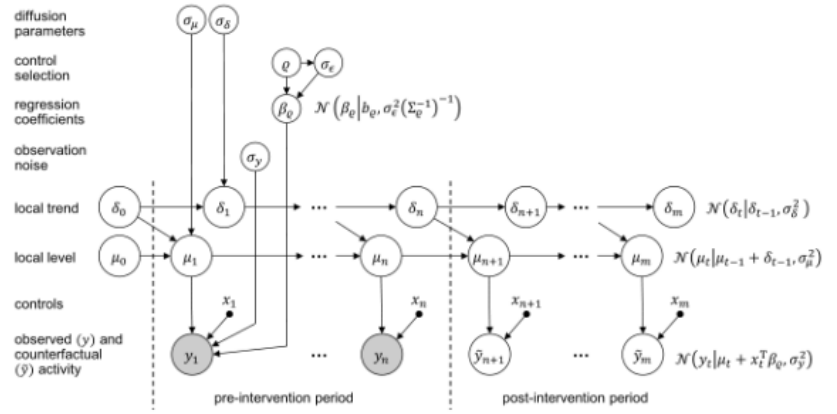


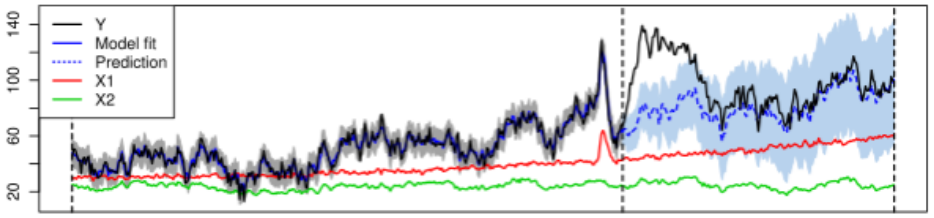
Bayesian Frameworks

- Structural Bayesian Time Series Analysis
- Counterfactual model: what would have happened in the absence of the intervention
- Build a predictive model of both situations
- Compare models to measure impact

CausalImpact

https://google.github.io/CausalImpact/CausalImpact.html





A/B Test Activity

- In groups of 3-4
- Review your experience of the HUDK4051 podcast
- What are the educational goals of the podcast?
- Choose one goal you wish to optimize
- Design an intervention that you think would impact your goal
- Design an A/B test to determine the impact of your intervention
    - How will you randomize?
    - How big do you expect the impact to be?
    - What