HUDK 4050: CORE METHODS IN EDM

10/25/17 12:46 PM

In the news

Owl Ventures, which funds edtech exclusively, just raised $185 million for its second fund

engadget

TC

FiveThirtyEight

The Media Has A Probability Problem

The media's demand for certainty — and its lack of statistical rigor — is a bad match for our complex world.

Google's AlphaGo AI no longer requires human input to master Go

Spotting Trends and Delivering Data to Connect Edtech Tools With Educator Needs *EdSurge*

NPE The Network for Public Education

The NPE Action/NPE 4th Annual Conference will be LIVESTREAMED on our Facebook page

Six Things Principals Are Thinking When They Get Pitched Edtech

EdTech Focus On K-12™

Digital Promise

Google Champions Teacher Tech Training with New Program

AEI

Degrees of Opportunity: Lessons Learned from State-Level Data on Postsecondary Earnings Outcomes

Yale Boosts Transparency Effort by Releasing More Budget Data

Diverse ISSUES IN HIGHER EDUCATION

Venture capital swoops into ed tech

SAN FRANCISCO BUSINESS TIMES

Forbes

Behavioral science is influencing policymaking—and helping parents teach their kids to read

QUARTZ

America's Richest Women 2017

INSIDE THE WEIRD WORLD OF SOCIAL MEDIA MARATHON CHEATING

How much should you be making?

stack **overflow**

WIRED

Events

Event	Date	Time	Location	URL
10 Best Ed Tech Products	October 26	12:30pm	CUNY	http://meet.meetup.com/wf/click?upn=pEEcc35irnY7Cq0tG1vyTtwOTrZ6JIjCxKpTsfzoCLqsGHBqclSYUVlLs4u4tBYSURJw1UnJzB8AVU5Je9yUlN-2Bep-2F0sFsYJWLhEuyCc8uZ1yC9nTceB2dlErMcITg-2BffN-2F23-2FJQomRXM3KPQPuVBZG6uljabeAerbi3NlKytFZ5BFjL7ddlgTDlIn9788vR2CMKQGVTH4OdHpAJZeks-2ByTupGldRkE0IkQ6cMuZlPTj1OiA3L7WRxw2JilQ1LFRyFCjXSDEx9RX1kirTiqApYLHp1STHOcecyWe6eD09HWFq-2BKIN72j4jPBV8xq-2F-2BnPuZqQ1nKQhyu7Sf-2F477iTVdmWI-2FJT3-2B3C7ATN3DDex7HIzBelAGaMOCn-2Fb2AI-2FWM3B_I3fs1g-2F466j3y5fD5Q61KTvREVidSz8eOmcqorpVEXY0QPCW1pElIAtwpVzx0Df3vNBhvxM8nwuYBFLv2GR4i8ECB3EPZLhNY2B-2Fz3U-2F-2FSf8QnbTLpKJjY7ean28dy62oDMJ2xy8ina4XlPT14V4RpnaQ8mE1FnRZgLoZJaR7DcBGvZ706Z6gPQfKYExvk1KBRJlCaiS6sZM353e8WhKXcv-2BBKMrWZ6fl-2BCPcolaG5g-3D
Intro to Data Science in R	November 1	11:00am	webinar	http://info.rstudio.com/g40jaCS0j203XN0YN000VRa
Privacy Localism: A New Research Agenda	November 3	all day	NYU Law School	http://www.law.nyu.edu/centers/ili/events/privacy-localism
The People's Disruption: Platform Co-Ops for Global Challenges	November 10/11	all day	The New School	https://platform.coop/2017
TC Microsoft Workshop	November 2	7:00pm	Grace Dodge 179	http://bit.ly/2yMGAYC
Bridging Industry and Academia to Tackle Responsible Research and Privacy Practices	November 2/3	all day	Facebook	https://fpf.org/research-privacy-practices/
TCLA Happy Hour	October 25	7:00	Artopolis	https://www.yelp.com/biz/artopolis-new-york

Opportunities

Data Engineering

- For Bachelors, Masters or PhDs (graduating by May 2018) & professional engineers
- Locations: Silicon Valley & NYC
- Details: http://xyz.insightdatascience.com/Insight_Data_Engineering_White_Paper.pdf?_ga=2.25153786.1556838475.1508260690-252934534.1508260690
- Apply:
http://insightdataengineering.com

Artificial Intelligence

- For Bachelors, Masters or PhDs (graduating by May 2018) & professional engineers
- Locations: Silicon Valley & NYC
- Details: http://xyz.insightdatascience.com/Insight_AI_White_Paper.pdf?_ga=2.249031111.1382199954.1508261612-1354589610.1508261612
- Apply:
http://insightdata.ai

Adaptive Systems

Adaptive

- Originally = <u>assistive</u>

- ~1990s = sequential estimate of aptitude (IRT)

- ~2012 = <u>a system that adapts the educational environment according to students' learning needs</u>

- Distinct from Intelligent Tutors in terms of methods employed

Adaptive Systems

Adaptive Engines

Recommender Systems

<u>Collaborative filter</u>: build a model from a user's past behavior + similar decisions made by other users

<u>Content filter</u>: utilize a series of discrete characteristics of an item in order to recommend additional items with similar properties

Essential Problem

- Dimensionality Reduction

  - Feature selection: select a subset of dimensions

  - Feature extraction: transform lots of dimensions into fewer dimensions

- Why?

  - As a form of insight

  - Avoid "Curse of Dimensionality"

Curse of Dimensionality

Sparsity: The more dimensions that we add, the more comparisons we are missing

	Stats	Cog Psy
Amy	3	2
Chen	2	2
Asif	1	3

Possible Combinations

3 - 3
3 - 2
3 - 1
2 - 3
2 - 2
2 - 1
1 - 3
1 - 2
1 - 1

Curse of Dimensionality

<u>Sparsity</u>: The more dimensions that we add, the more comparisons we are missing

	Stats	Cog Psy	Socio-logy	Crit Theory	Wood-work	Data Sci	Music	Design
Amy	3	2	1	1	3	2	2	2
Chen	2	2	2	3	1	3	2	3
Asif	1	3	3	7	3	2	1	1

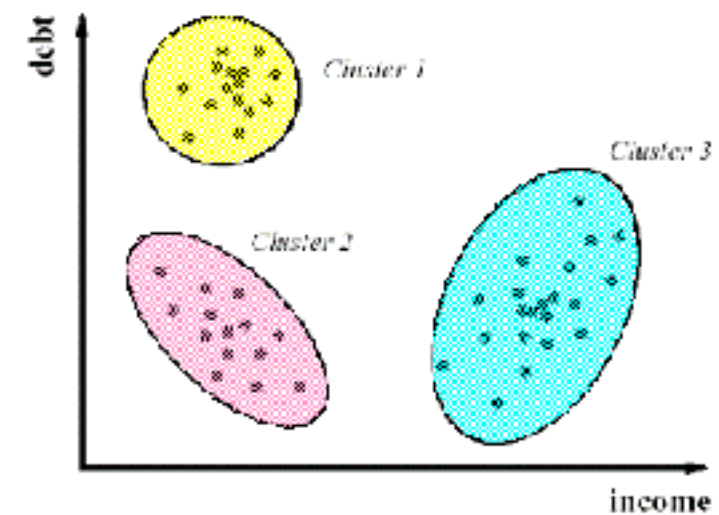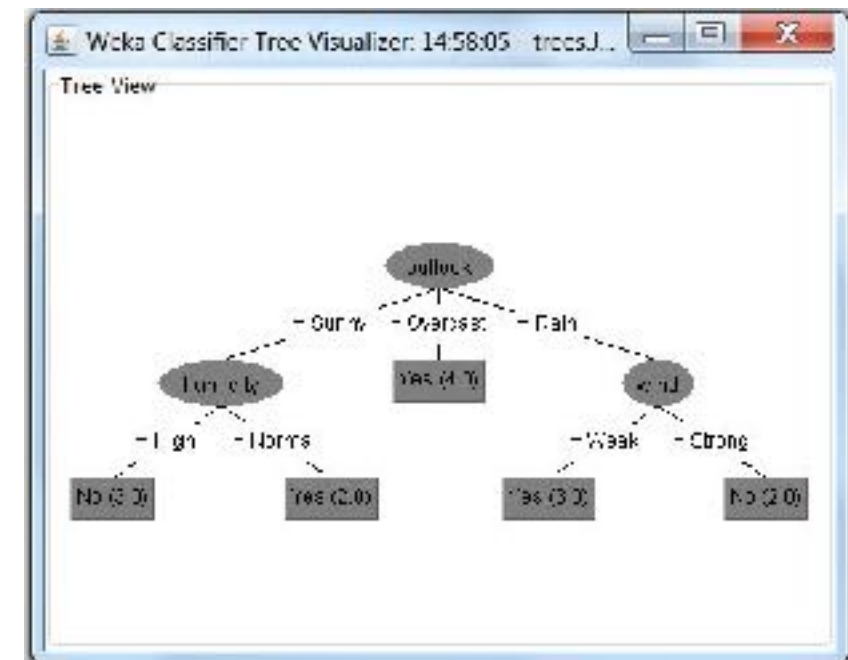# How to reduce dimensions?

Cluster Analysis

Mean, median, mode

Principle Component Analysis

Decision Tree

Dimensionality Reduction

Cluster Analysis

Grouping stuff

By Variables

ID	Var1	Var2	Var3
A			
B			
C			
D			

ID	Var2
A	
B	
C	
D	

Selection

ID	Var2+3
A	
B	
C	
D	

Extraction

By People

ID	Var1	Var2	Var3
A			
C			

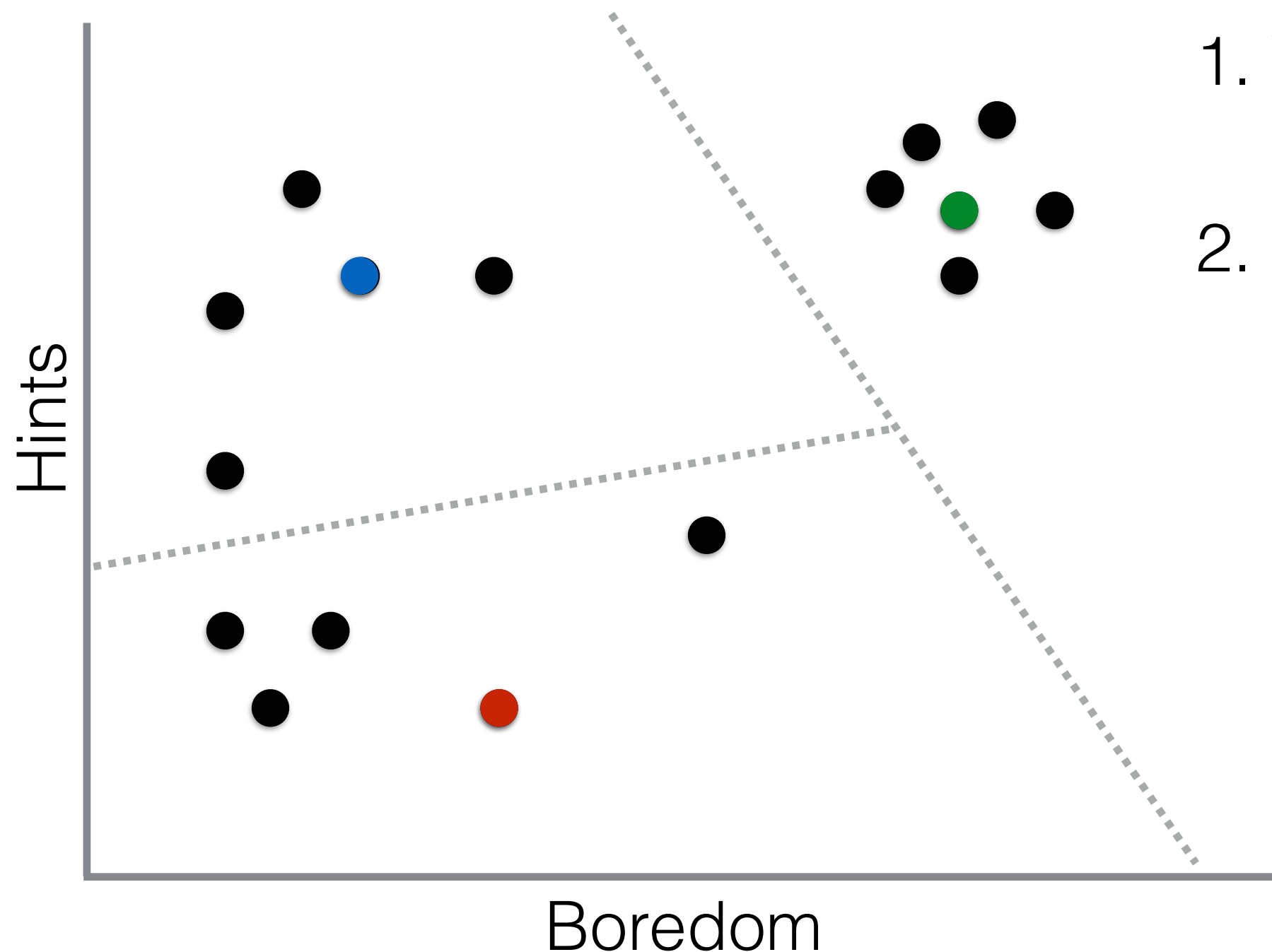| ID	Var1	Var2	Var3
B			
D			

Cluster Analysis: K-means
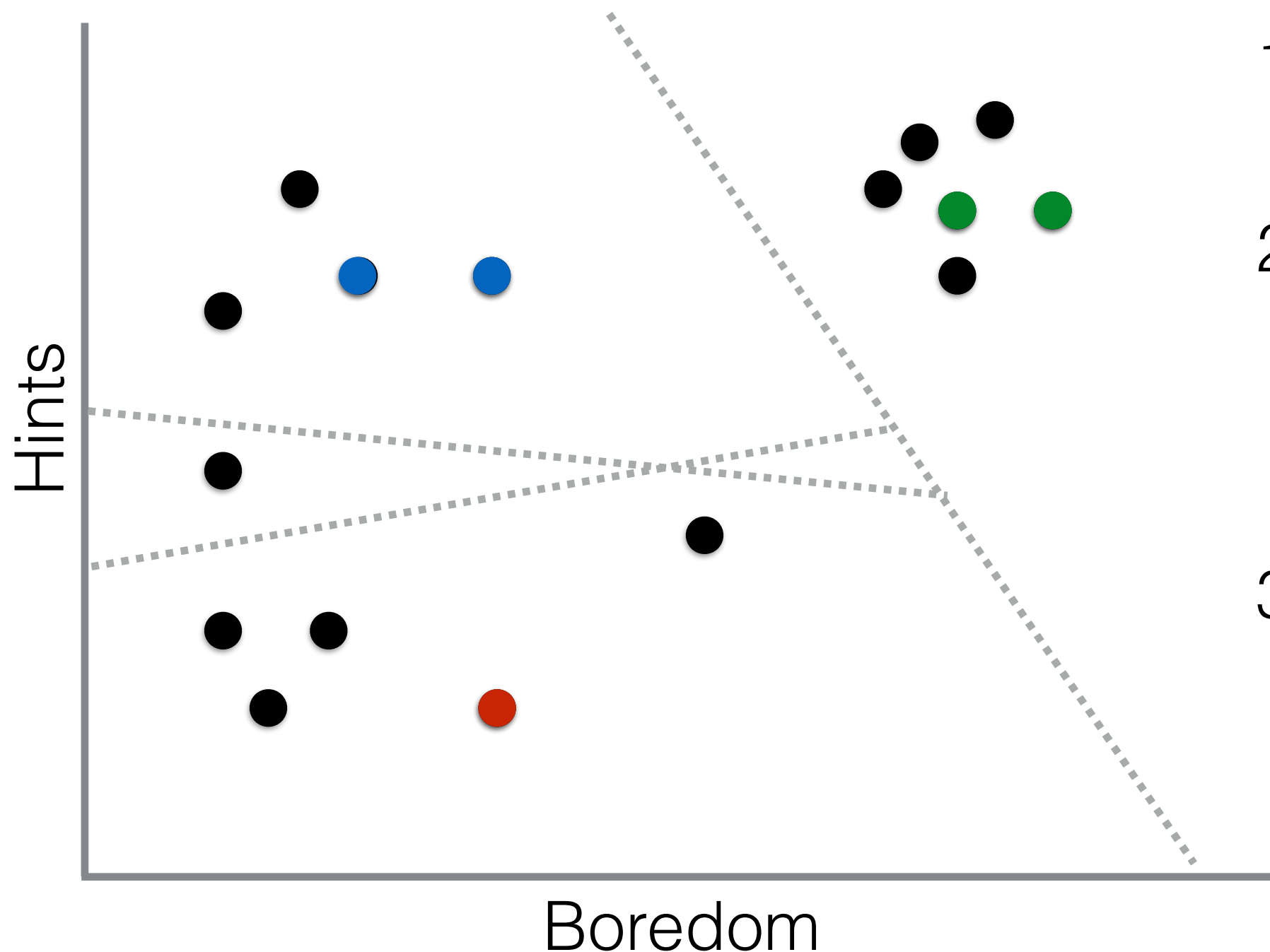
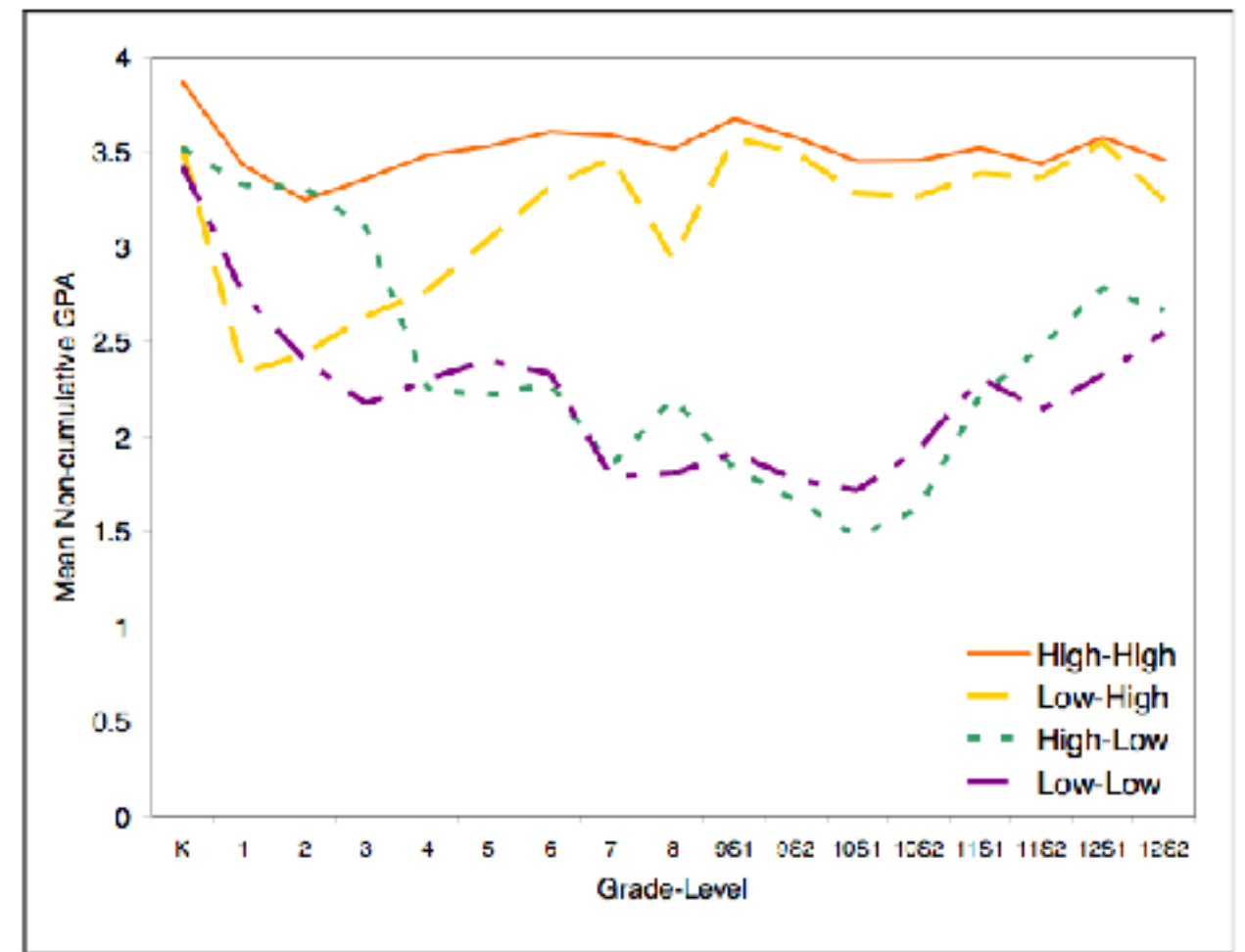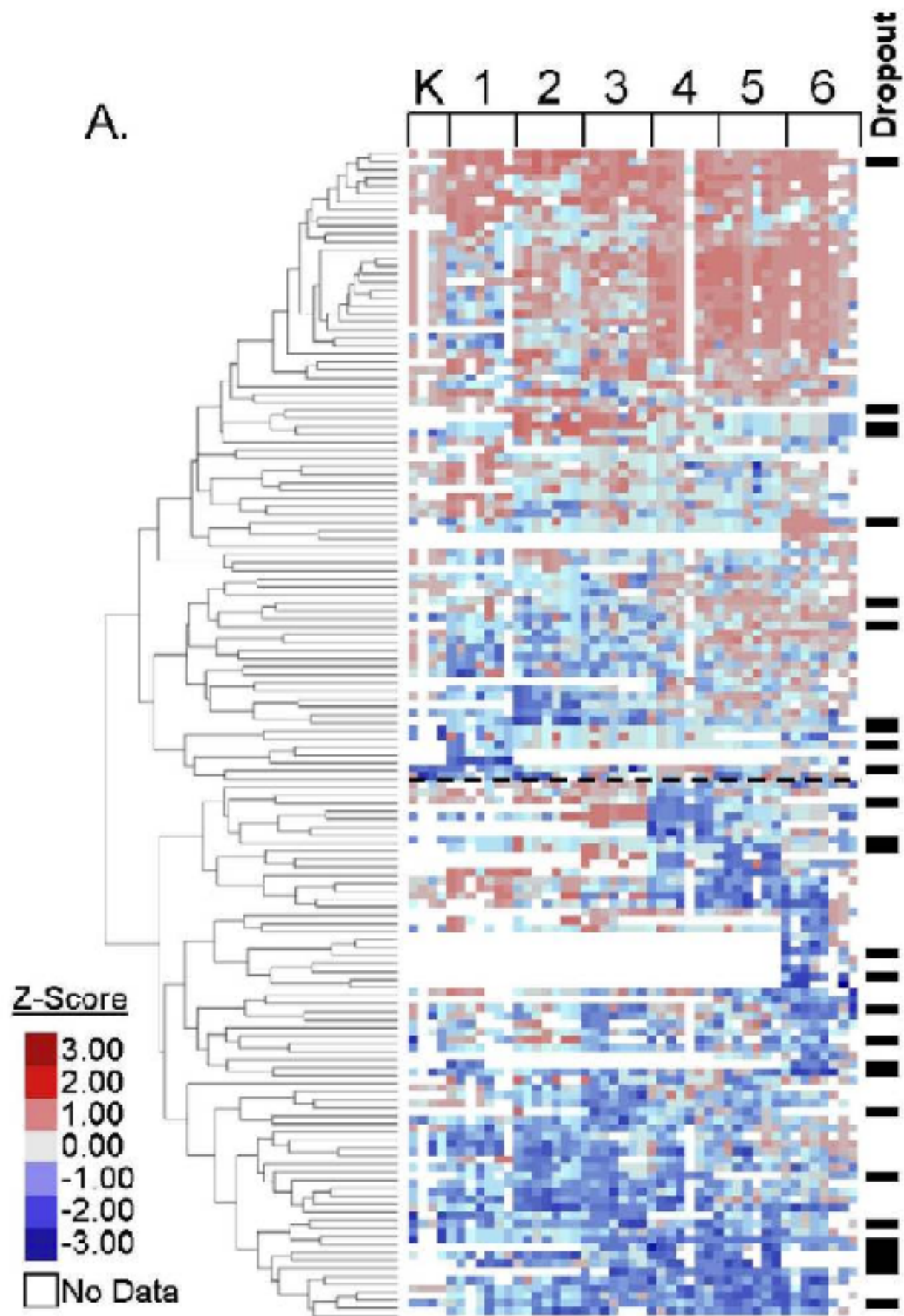1. Select some random points

2. Associate those points with closest other points

3. Move the selected point to the mean point in the cluster

Hints

Boredom

Cluster Analysis: K-means

1. Very sensitive to starting values

2. Not good at dealing with complex shapes

Hints

Boredom

A.

Bowers (2010)

Grouping stuff

By Variables

ID	Var1	Var2	Var3
A			
B			
C			
D			

By People

ID	Var1	Var2	Var3
A			
C			

ID	Var1	Var2	Var3
B			
D			

ID	Var2
A	
B	
C	
D	

Selection

ID	Var2+3
A	
B	
C	
D	

Extraction

Feature Extraction

- Principal Component Analysis

  - Variance

  - Covariance

  - Matrix algebra

Cluster Survey

http://bit.ly/2y3y8zV

Process

1. Describe data

2. Choose methodology

3. Make notes on the purpose of the method

4. Make notes on the limitations of the method (gotchas)

5. Research the code

6. Apply the code

Cluster Example