

University of Illinois
Deloitte Foundation
Center for Business Analytics

January 12, 2018

Agenda

- Introductions
- Review Center Charge
- What are we doing?
- What might we do?



Perspectives

Deloitte on disruption

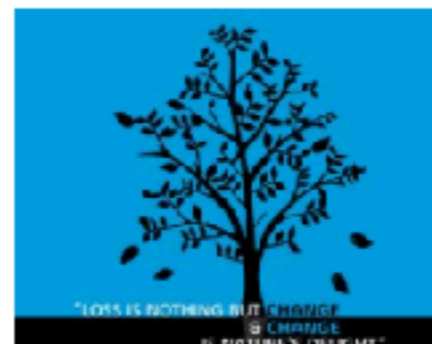
Changing course in a disruptive world

Remember several years ago, when every street corner and strip mall seemed to have a big blue Blockbuster? In 2004, Blockbuster was the dominant, unassailable leader in home video rental, with 9,000 stores and 60,000 employees. Who could have predicted that just six years later, the industry giant that took out nearly all the neighborhood mom-and-pop rental shops would itself be taken out?



Disruption: A permanent fact of life

In hindsight, Blockbuster wasn't taken down by a single competitor, but by its own failure to respond when strategic risks threatened the underpinnings of its business model. The lesson isn't simply about the



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[Disruption: A permanent fact of life](#)

[Living in a "VUCA" world](#)

[Risk is not a game](#)

[We're only human](#)

[What smart companies will do](#)



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Special Report Disruption & Technology

There is no area of business, society or life which technology is not upending. This report looks at the fullest range, from gold mining in Russia to gay bars in London





Disconnect

1815 Miles

Academic Worldview





Thought Leaders in Accounting

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WASHINGTON, DC 2018
PATHWAYS TO A SUSTAINABLE FUTURE
American Accounting Association Annual Meeting and Conference on Teaching and Learning in Accounting

AUG 4-8
SAVE THE DATE!

#AAA2018DC

CALL FOR SUBMISSIONS ARE NOW OPEN!

LEARN MORE

About the American Accounting Association

The American Accounting Association is the premier community of accountants in academia. Founded in 1916, we have a rich and reputable

Tweets

- AAA - JMAIT Retweeted
- Margaret Christ** @GisAccInt
Thank you to @pccopcon for a great plenary! #AAAMAS2018 #ogmateachingsymposium

Suggestion Box

Our strategy is to be thought leaders in accounting - what ideas do you have for how Sections, Regions and the Association can work towards that goal?

VUCA Worldview

VUCA Worldview

Volatile

Uncertain

Complex

Ambiguous

Visioning Exercise



address.com



[Advice & How To](#)

Tech Topics

[Podcasts](#)



AI, machine & deep learning

APIs

autonomous cars & drones

big data

bio

blockchain & cryptocurrencies

China

cloud computing

coding literacy

design

ecommerce

fintech

food

gaming

innovation clusters

marketplaces

messaging

mobile

networking

online communities

open source

payments

policy

quantum computing

SaaS

security & privacy

transportation

virtual & augmented reality



ah167.com



Advice & How To

Tech Topics

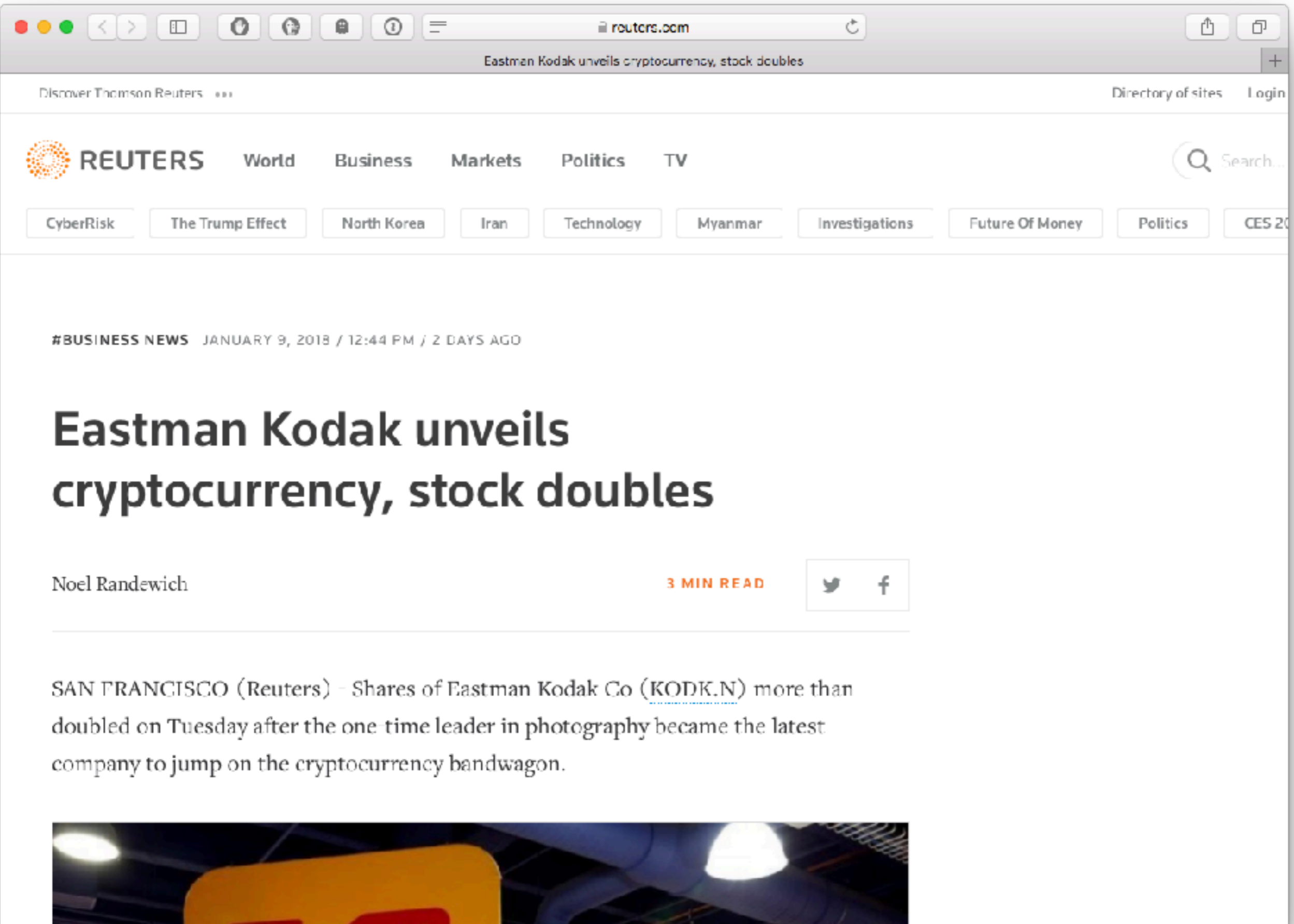
Podcasts



AI, machine & deep learning	APIs	autonomous cars & drones	big data	bio	blockchain & cryptocurrencies
China	cloud computing	coding literacy	design	ecommerce	fintech
food	gaming	innovation clusters	marketplaces	messaging	mobile
networking	online communities	open source	payments	policy	quantum computing
SaaS	security & privacy	transportation	virtual & augmented reality		

Deloitte.

Blockchain Technology
A game-changer
in accounting?



#BUSINESS NEWS JANUARY 9, 2018 / 12:44 PM / 2 DAYS AGO

Eastman Kodak unveils cryptocurrency, stock doubles

Noel Randewich

3 MIN READ



SAN FRANCISCO (Reuters) - Shares of Eastman Kodak Co ([KODK.N](#)) more than doubled on Tuesday after the one-time leader in photography became the latest company to jump on the cryptocurrency bandwagon.



There is no area of
business,
society,
or life
which technology is not
upending.



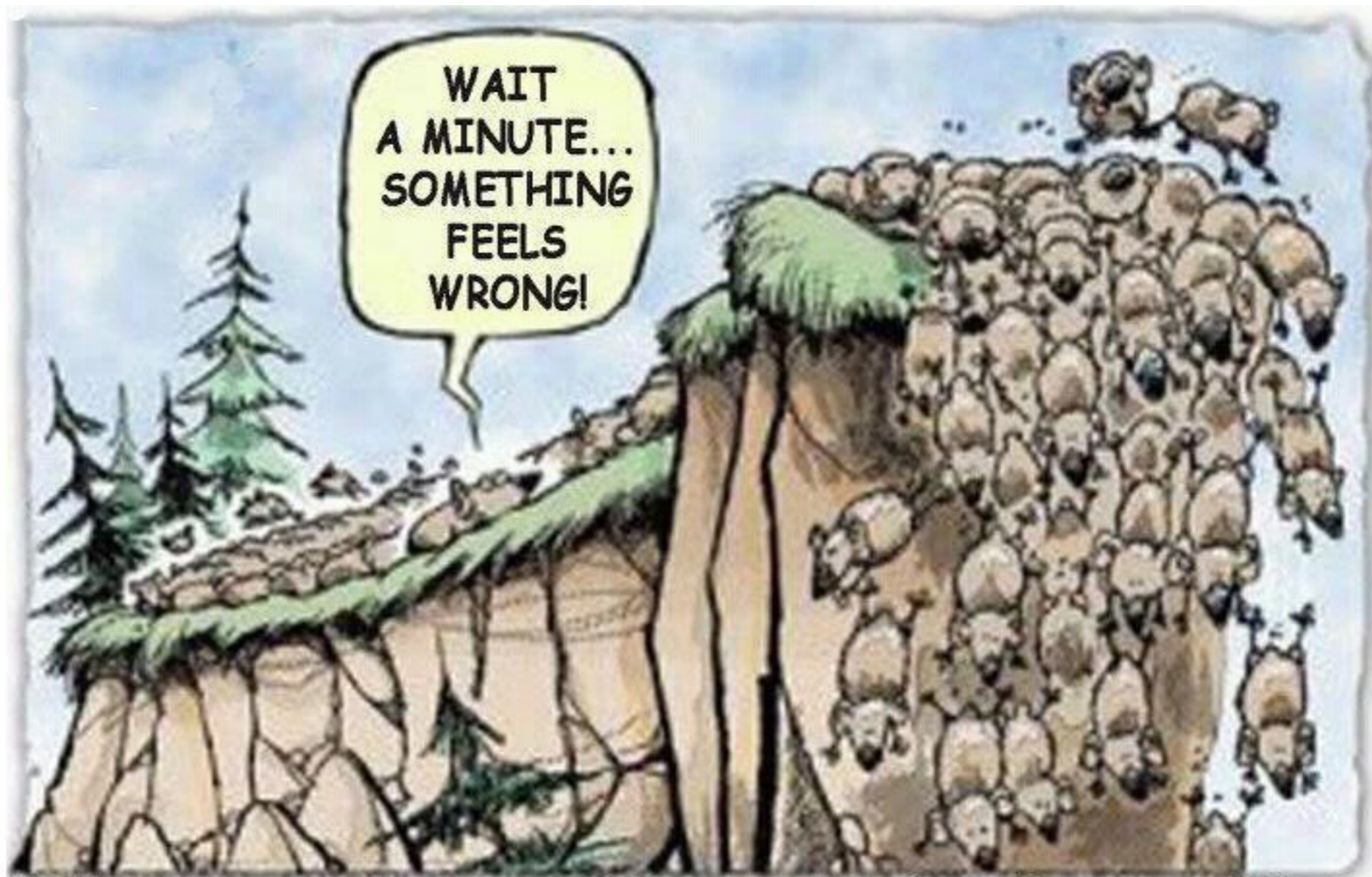
KEEP CALM

AND

Continue

Business

as usual



**"Shut up, you moron! Do as you've been told
It's for your own good!"**

Introduction

Who is this Person?

Professor, Department of Accountancy

Professor, School of Information Sciences

Director, University of Illinois- Deloitte Foundation, Center for Business Analytics

Data Science Expert in Residence, Research Park, University of Illinois

Affiliate Faculty, Departments of Astronomy, Computer Science, Electrical and Computer Engineering, Informatics, Physics, and Statistics

Faculty Affiliate, NCSA

Faculty Affiliate, Beckman Institute

Faculty Affiliate, Computational Science & Engineering



Deloitte's Charge

D.1.a. The overarching goal and objective of the Center will be to **further the integration of STEM disciplines in business education in said College**. To that end, the Center's activities **may include but not be limited to** the following:

- **Create and disseminate a replicable model curriculum** that provides students from across the United States with a comprehensive education in business analytics;
- **Provide faculty development opportunities in business analytics** with the goal of creating a core faculty group from across the country to convey the role and value of data in the contemporary business environment;
- **Develop faculty understanding of business analytics issues** and translate issues into course development;
- **Address new Association to Advance Collegiate Schools of Business (AACSB) standards** for requiring business analytics in accounting curriculum;
- **Establish a Center website and social media tools** to rapidly disseminate information such as educational program content, events, and best practices;
- **Establish strategic partnerships** with industry leaders, professional organizations, and key academic institutions to build a network addressing important issues.

College's Charge



University of Illinois-Deloitte Foundation
Center for Business Analytics

A cluster of five interlocking gears in blue and yellow, arranged in a circular pattern on the left side of the slide.

Innovation Engine

Accelerating bright ideas.

I
ILLINOIS
Gies College of Business



GIES

What are we doing?

UI-DF CBA

- Website & Social Media
- Analytics in Curricula
 - Public Dissemination
- Case Studies
- Center Fellows



University of Illinois-Deloitte Foundation Center for Business Analytics

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THE FUTURE OF DATA ANALYTICS IS HERE

The **University of Illinois-Deloitte Foundation Center for Business Analytics** is on the leading edge of data analytics. We can help you get there, too.



Educators

Let us help you rethink your entire business curriculum.



Researchers

Modernize your thinking and scale your efforts to larger data volumes.



Students

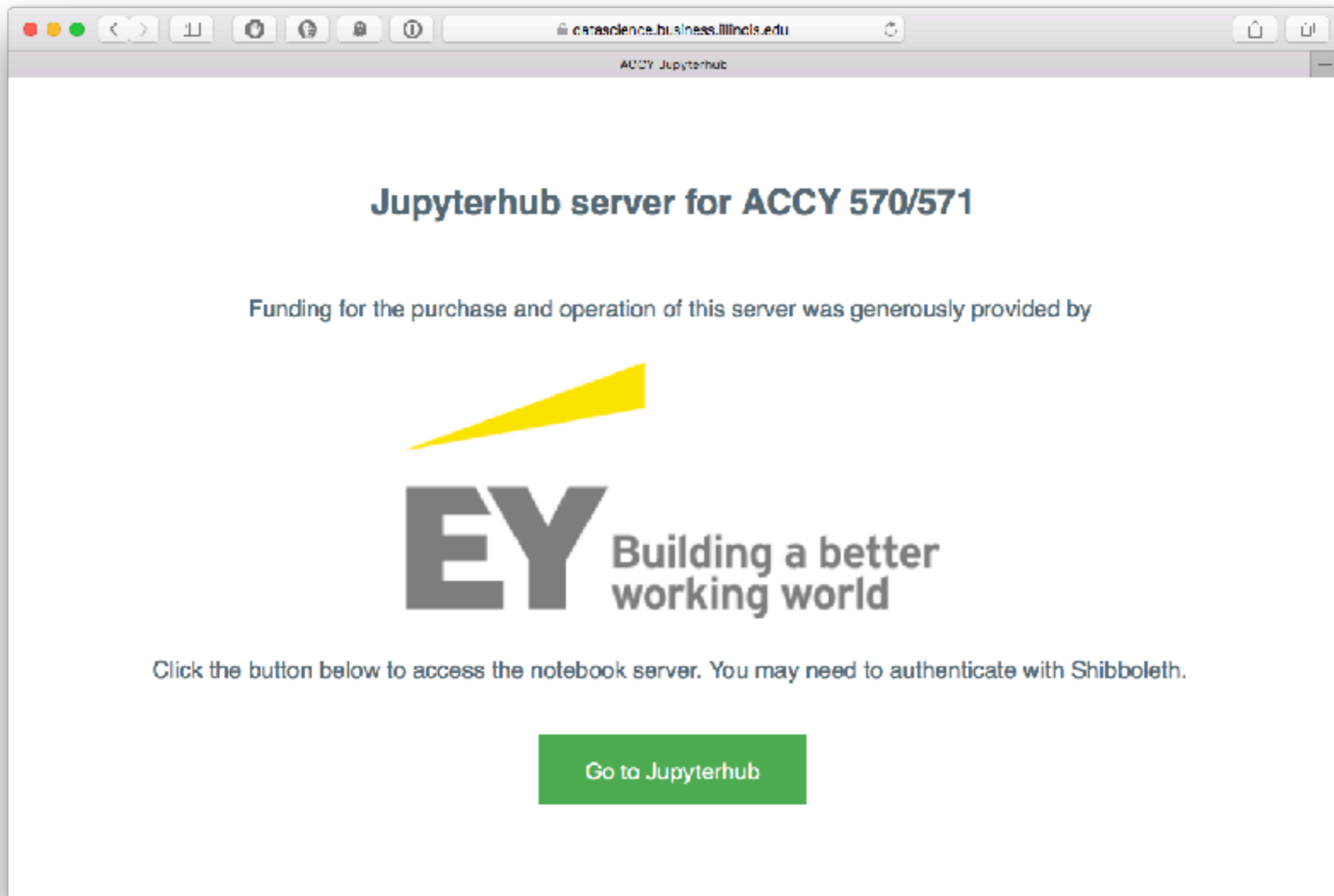
Be empowered to think entrepreneurially with big data.



Corporations

Create academic-industry partnerships around data analytics.


Analytics in Curricula



The image shows a browser window with the address bar displaying `data-science.business.illinois.edu`. The page title is "ACCY Jupyterhub". The main content of the page is as follows:

Jupyterhub server for ACCY 570/571

Funding for the purchase and operation of this server was generously provided by

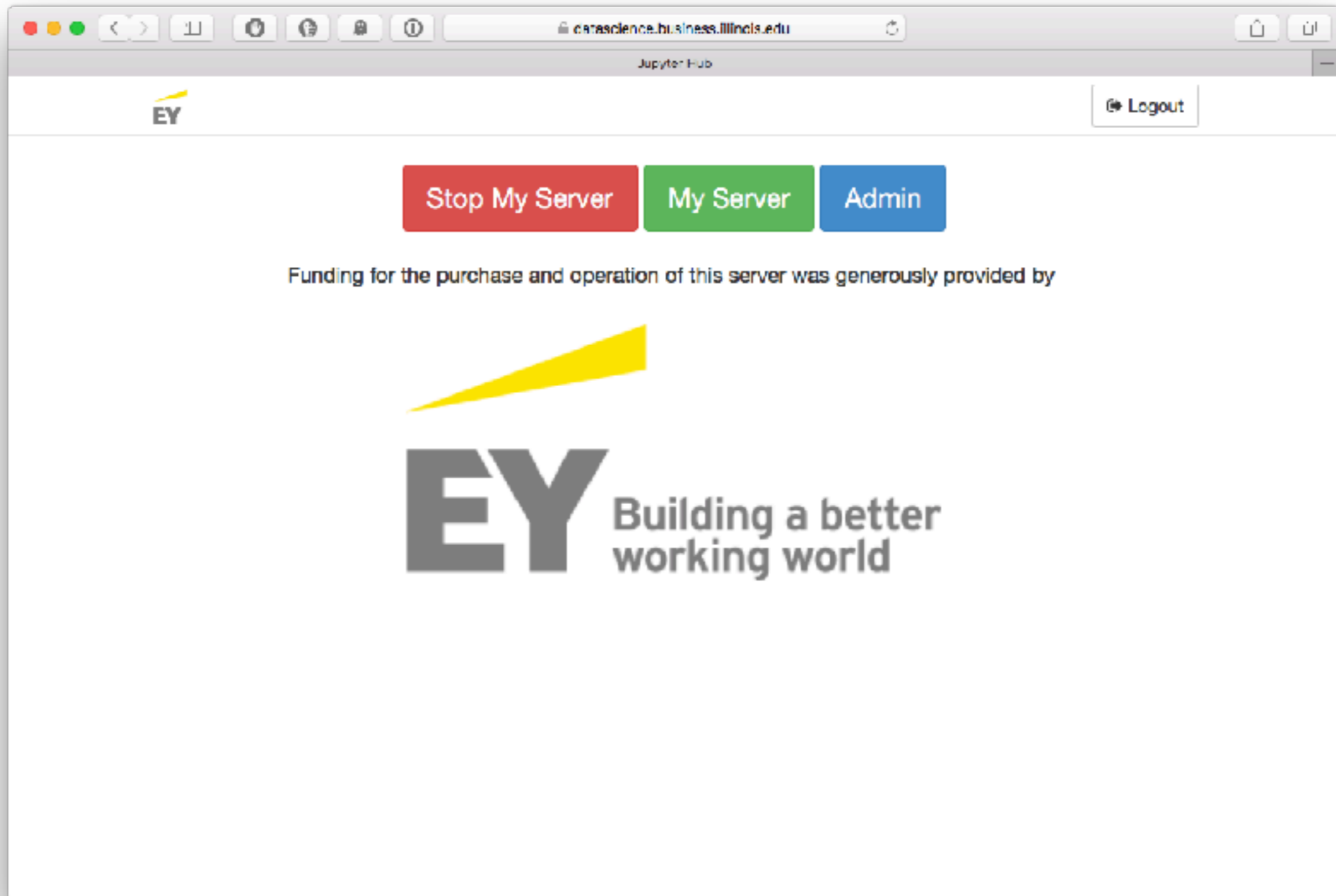


EY Building a better working world

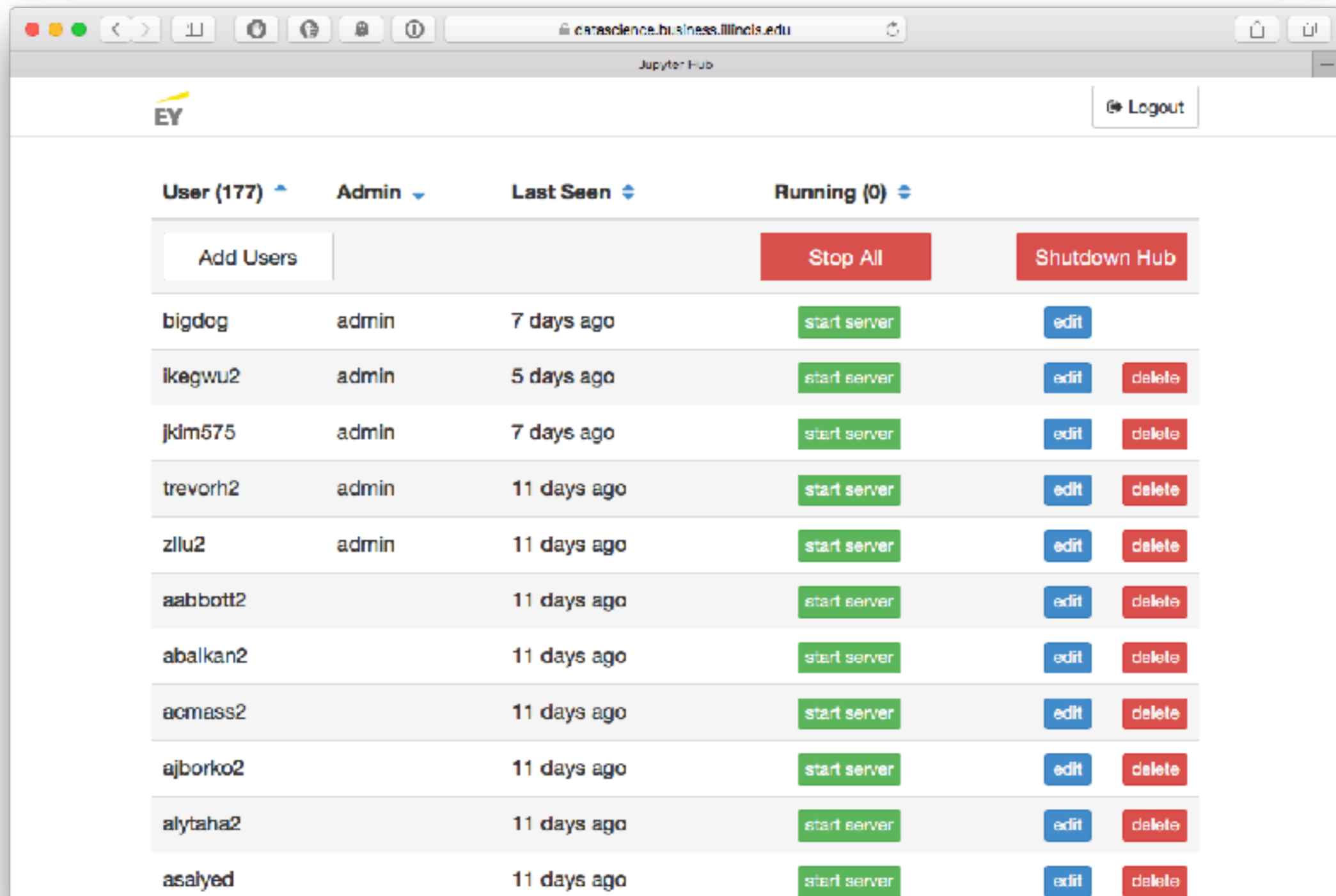
Click the button below to access the notebook server. You may need to authenticate with Shibboleth.

[Go to Jupyterhub](#)

Analytics in Curricula



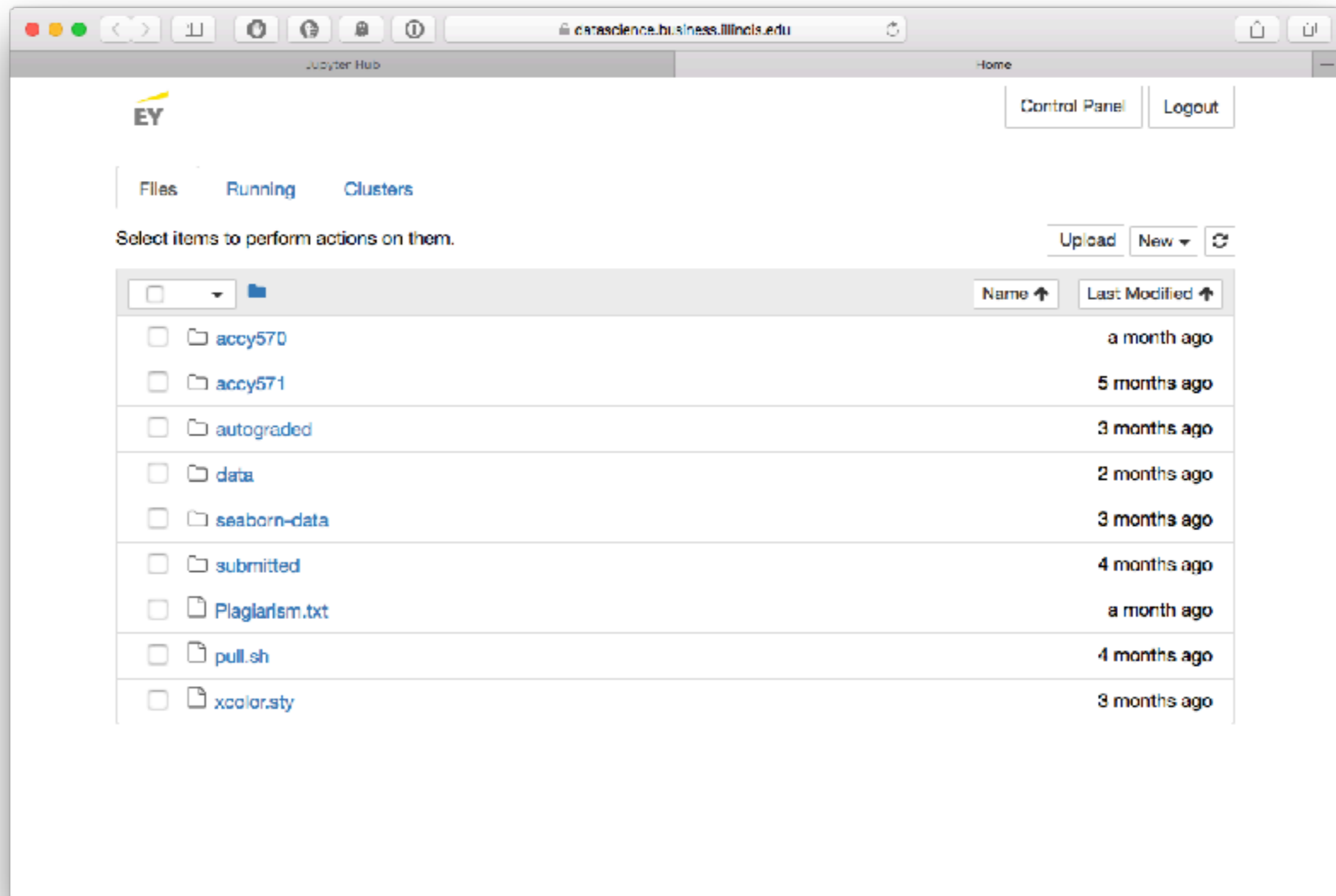
Analytics in Curricula



The screenshot shows the Jupyter Hub user management interface. The browser address bar displays `data-science.business.illinois.edu`. The page title is "Jupyter Hub". The EY logo is visible in the top left, and a "Logout" button is in the top right. The main content area features a table with columns for "User (177)", "Admin", "Last Seen", and "Running (0)". Below the table are three buttons: "Add Users", "Stop All", and "Shutdown Hub". The table lists several users, each with a "start server" button, an "edit" button, and a "delete" button.

User (177)	Admin	Last Seen	Running (0)
<div style="display: flex; justify-content: space-between;">Add UsersStop AllShutdown Hub</div>			
bigdog	admin	7 days ago	start server edit
ikegwu2	admin	5 days ago	start server edit delete
jklm575	admin	7 days ago	start server edit delete
trevorh2	admin	11 days ago	start server edit delete
zllu2	admin	11 days ago	start server edit delete
aabbott2		11 days ago	start server edit delete
abalkan2		11 days ago	start server edit delete
acmass2		11 days ago	start server edit delete
ajborko2		11 days ago	start server edit delete
alytaha2		11 days ago	start server edit delete
asalyed		11 days ago	start server edit delete

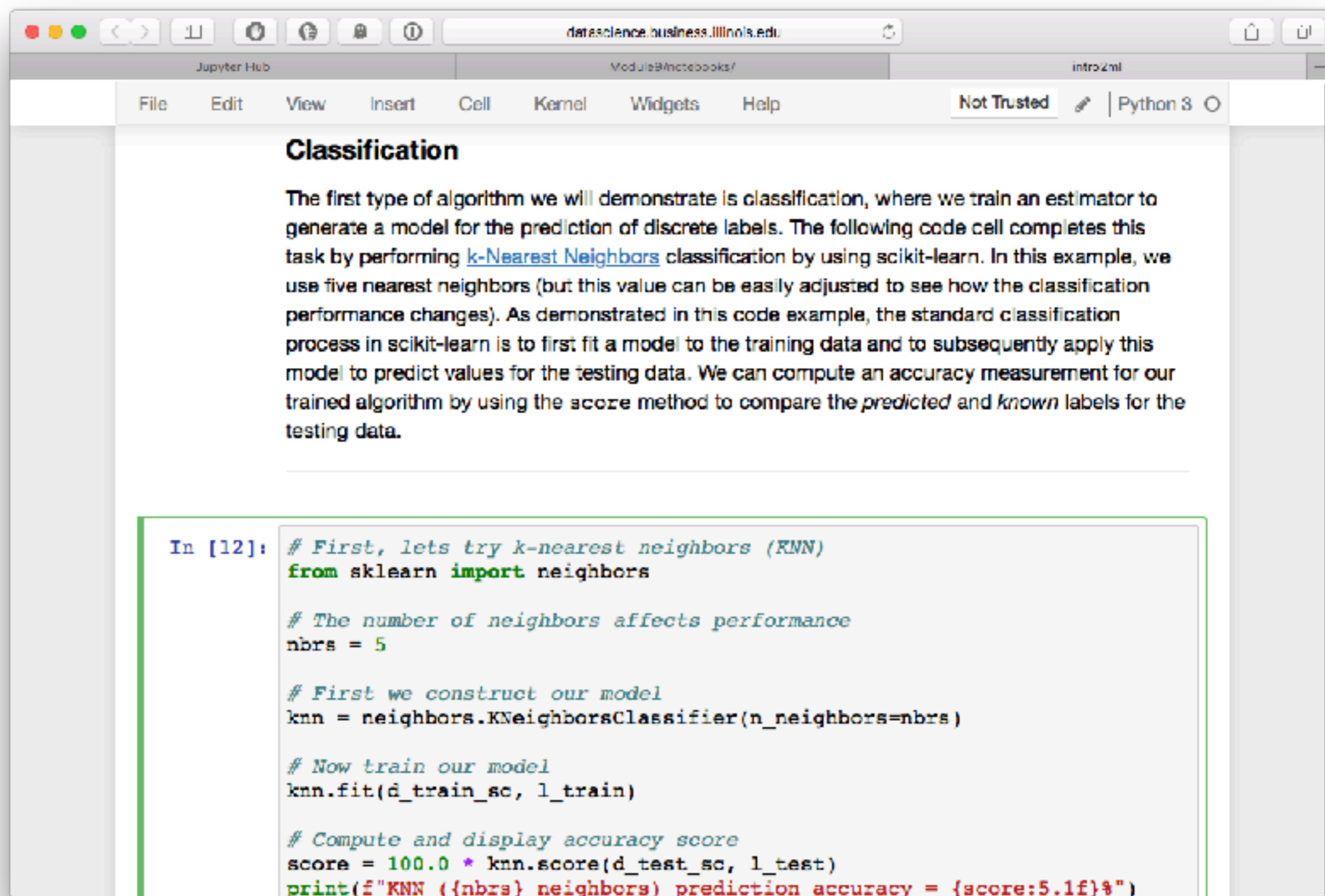
Analytics in Curricula



The screenshot shows a web browser window displaying the Jupyter Hub interface. The address bar shows the URL `data-science.business.illinois.edu`. The page title is "Jupyter Hub" and the user is logged in as "Home". The EY logo is visible in the top left corner. In the top right, there are buttons for "Control Panel" and "Logout". Below the logo, there are tabs for "Files", "Running", and "Clusters". A message says "Select items to perform actions on them." To the right of this message are buttons for "Upload", "New", and a refresh icon. The main content area shows a file browser with a table of items:

<input type="checkbox"/>	Name ↑	Last Modified ↑
<input type="checkbox"/>	accy570	a month ago
<input type="checkbox"/>	accy571	5 months ago
<input type="checkbox"/>	autograded	3 months ago
<input type="checkbox"/>	data	2 months ago
<input type="checkbox"/>	seaborn-data	3 months ago
<input type="checkbox"/>	submitted	4 months ago
<input type="checkbox"/>	Plagiarism.txt	a month ago
<input type="checkbox"/>	pull.sh	4 months ago
<input type="checkbox"/>	xcolor.sty	3 months ago

Analytics in Curricula



The screenshot shows a Jupyter Notebook window with a browser address bar at the top displaying 'datascience.business.illinois.edu'. The notebook interface includes a menu bar with 'File', 'Edit', 'View', 'Insert', 'Cell', 'Kernel', 'Widgets', and 'Help'. A status bar on the right indicates 'Not Trusted' and 'Python 3'. The notebook content is divided into two cells:

Classification

The first type of algorithm we will demonstrate is classification, where we train an estimator to generate a model for the prediction of discrete labels. The following code cell completes this task by performing [k-Nearest Neighbors](#) classification by using scikit-learn. In this example, we use five nearest neighbors (but this value can be easily adjusted to see how the classification performance changes). As demonstrated in this code example, the standard classification process in scikit-learn is to first fit a model to the training data and to subsequently apply this model to predict values for the testing data. We can compute an accuracy measurement for our trained algorithm by using the `score` method to compare the *predicted* and *known* labels for the testing data.

```
In [12]: # First, lets try k-nearest neighbors (KNN)
from sklearn import neighbors

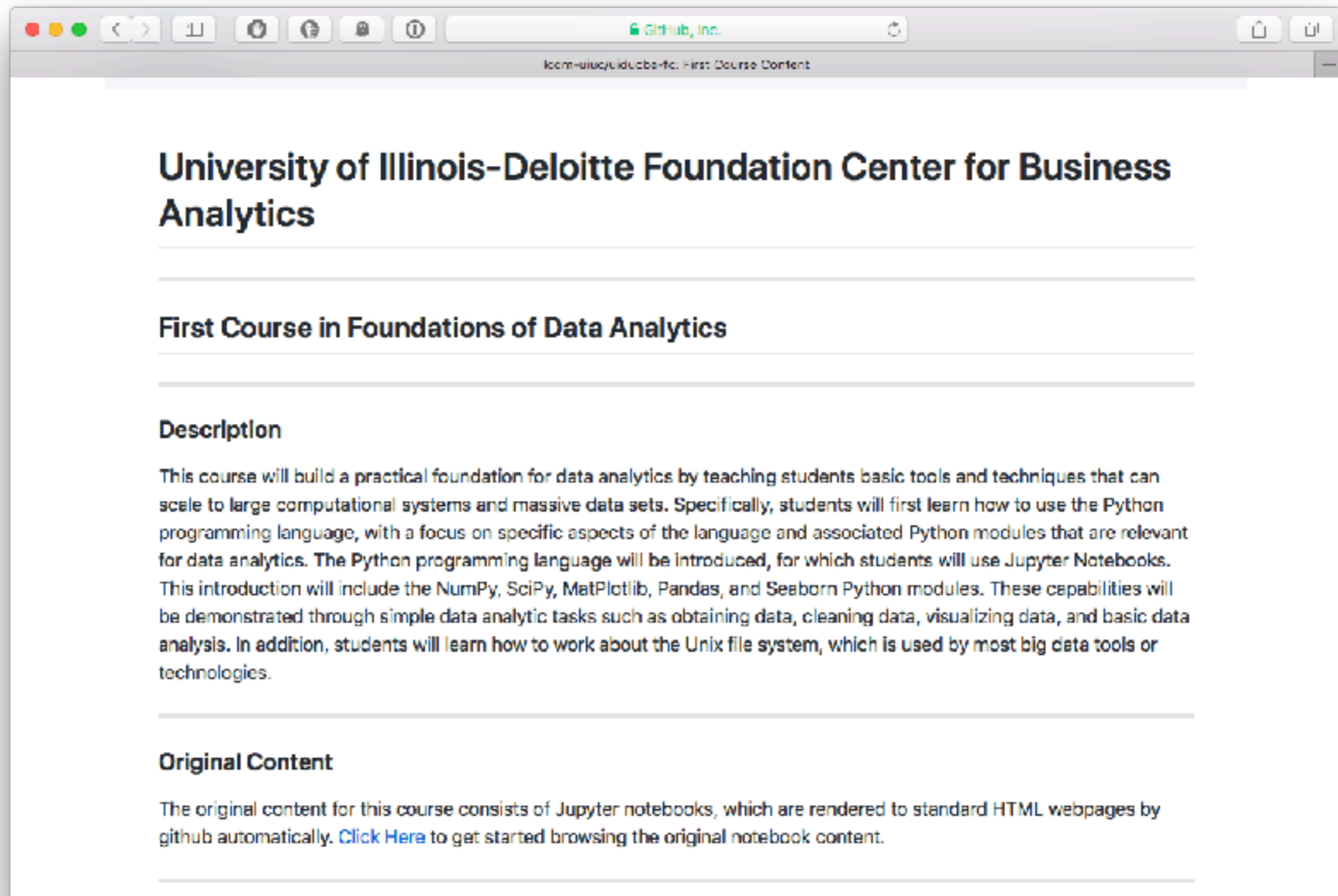
# The number of neighbors affects performance
nbrs = 5

# First we construct our model
knn = neighbors.KNeighborsClassifier(n_neighbors=nbrs)

# Now train our model
knn.fit(d_train_sc, l_train)

# Compute and display accuracy score
score = 100.0 * knn.score(d_test_sc, l_test)
print(f"KNN ({nbrs} neighbors) prediction accuracy = {score:5.1f}%")
```

Analytics in Curricula



University of Illinois-Deloitte Foundation Center for Business Analytics

First Course in Foundations of Data Analytics

Description

This course will build a practical foundation for data analytics by teaching students basic tools and techniques that can scale to large computational systems and massive data sets. Specifically, students will first learn how to use the Python programming language, with a focus on specific aspects of the language and associated Python modules that are relevant for data analytics. The Python programming language will be introduced, for which students will use Jupyter Notebooks. This introduction will include the NumPy, SciPy, Matplotlib, Pandas, and Seaborn Python modules. These capabilities will be demonstrated through simple data analytic tasks such as obtaining data, cleaning data, visualizing data, and basic data analysis. In addition, students will learn how to work about the Unix file system, which is used by most big data tools or technologies.

Original Content

The original content for this course consists of Jupyter notebooks, which are rendered to standard HTML webpages by github automatically. [Click Here](#) to get started browsing the original notebook content.

UIDF-CBA Fellows



Ramanath
Subramanyam



Jessen Hobson



Vic Anand

Analytics in Curricula

**Proposed Syllabus
Business Analytics I - BADM 210
Credits: 3 Hours**

Course Description:

The focus of this introductory business analytics course will be on collecting, describing and interpreting data in the context of business decisions. The course will introduce the concepts of a data life cycle, data visualization, and data summarization. Students will be able to perform and understand essential statistical inference methods including hypothesis testing and multivariate regression. Students will learn how to identify, describe and frame business opportunities through evidence-based storytelling and hands-on learning using spreadsheets and data visualization tools. The problem contexts will span the business domain areas (e.g., Marketing, Operations, Finance, Accounting, and Technology).

**Proposed Syllabus
Business Analytics II – BADM 211
Credits: 3 Hours**

Course Objective:

This course builds on the foundation from the Business Analytics I (BADM 210) course, and introduces the students to analyzing, learning, and prediction using advanced analytics techniques and tools for generating business insights. This course will provide a practical introduction to unsupervised learning techniques such as clustering and text mining, supervised learning techniques such as classification and decision trees, and temporal learning techniques such as time series analysis. Finally, the course will introduce students to advanced and emerging topics in predictive analytics. The course synthesizes concepts through hands-on application and project-based learning. Students will learn to identify opportunities for improving business decisions using data, conduct relevant analysis of the gathered and cleaned data, and finally, interpret and present analysis outcomes to decision makers.

College-wide
foundation for more
advanced curricula

Education



A screenshot of a web browser displaying the Data Carpentry website. The browser's address bar shows 'datacarpentry.org'. The website has a navigation menu with links for HOME, ABOUT, WORKSHOPS, GET INVOLVED, LESSONS, BLOG, FOR INSTRUCTORS, SPONSORS, and CONTACT. The main content area features a wood-grain background with the Data Carpentry logo (a stylized 'D' with vertical bars) and the text 'DATA CARPENTRY' and 'BUILDING COMMUNITIES TEACHING UNIVERSAL DATA LITERACY'. Below this, there is a paragraph of text describing the organization's mission and a link to 'Recent Blog Posts >> A Week o' Carpentry'. At the bottom, there are three buttons: 'Host a Workshop', 'Attend a Workshop', and 'Get Involved'. A small note at the bottom left says 'Open "www.datacarpentry.org" in a new tab'.

Need a leader

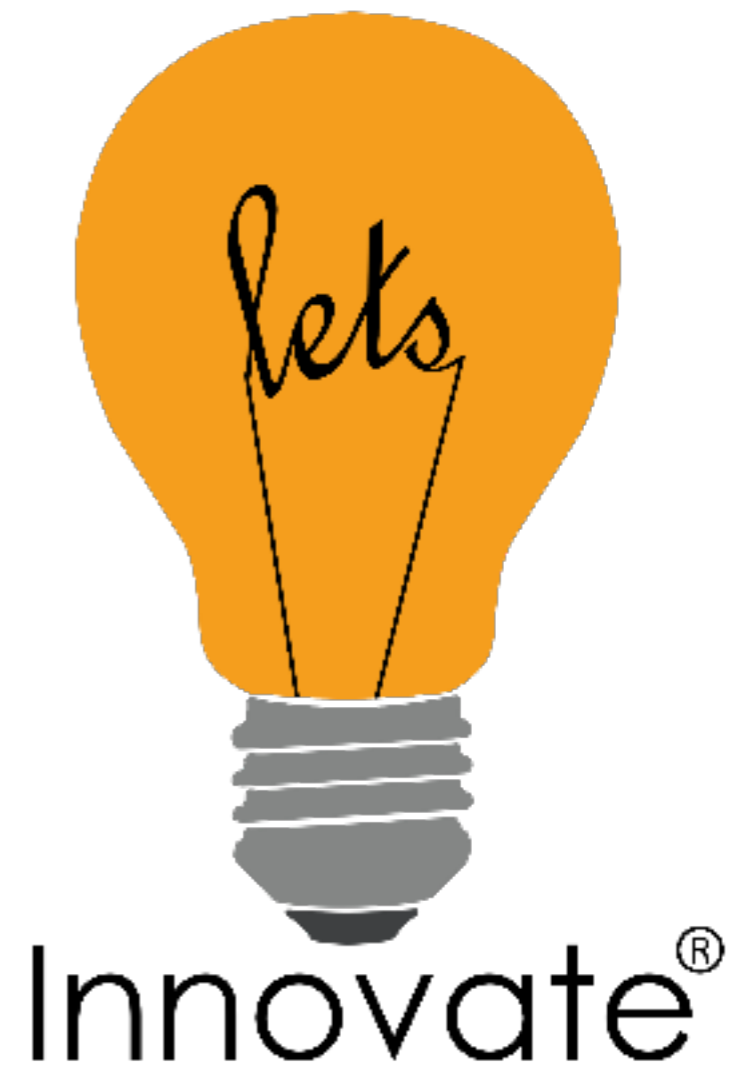
Education



What might we do?

UI-DF CBA

- Education
- Research
- Engagement
- Conferences



Best Practices

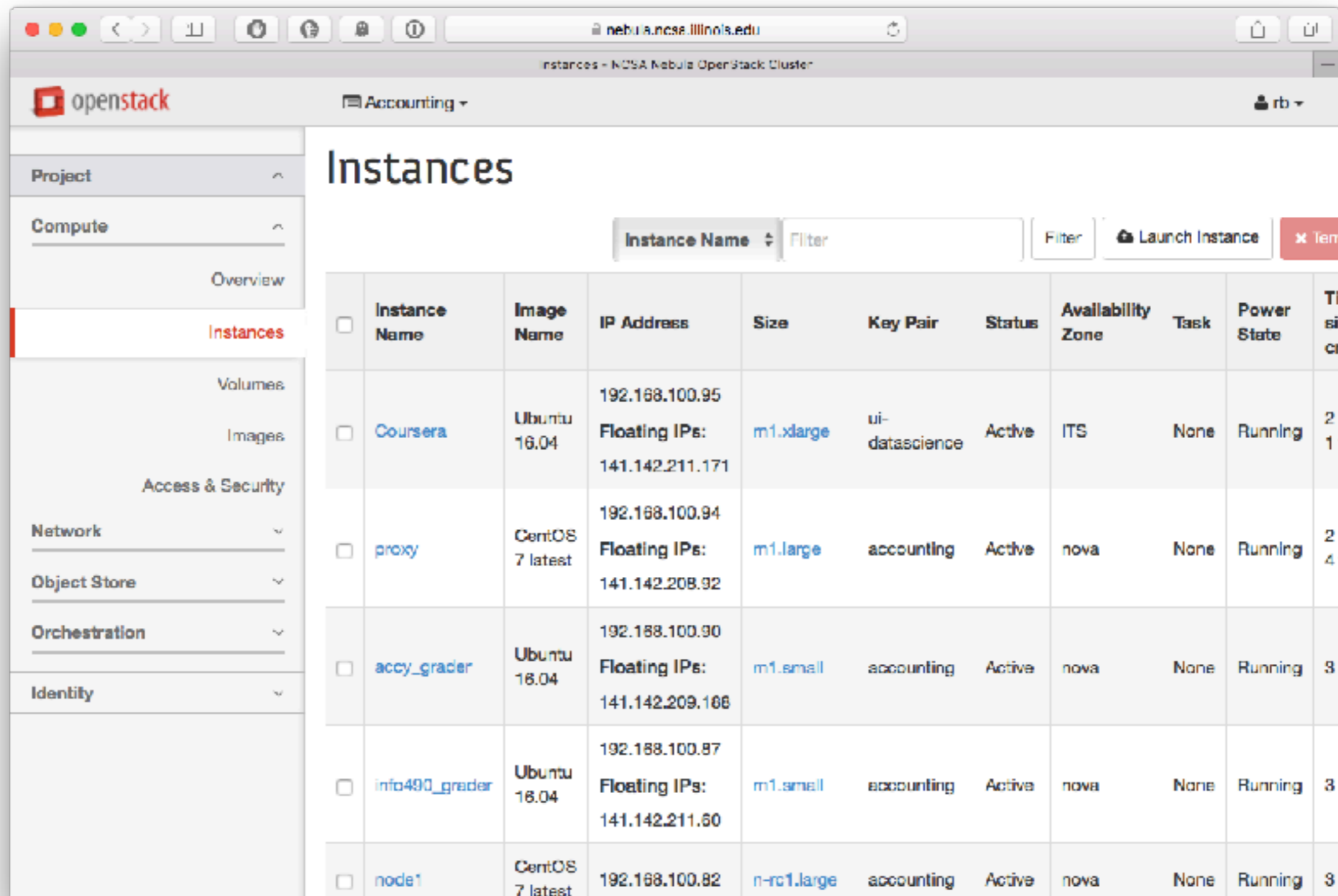
The screenshot displays the OpenStack dashboard interface. The top navigation bar includes the OpenStack logo, an 'Accounting' dropdown menu, and a user profile icon labeled 'rb'. The left sidebar contains a menu with categories: Project, Compute, Access & Security, Network, Object Store, Orchestration, and Identity. The main content area is titled 'Overview' and features a 'Limit Summary' section with seven pie charts representing resource usage:

- Instances:** Used 12 of 600
- VCPUs:** Used 68 of 1,440
- RAM:** Used 152GB of 2TB
- Floating IPs:** Allocated 11 of 50
- Security Groups:** Used 9 of 10
- Volumes:** Used 6 of 600
- Volume Storage:** Used 34.2TB of 48.8TB

Below the charts is a 'Usage Summary' section with the instruction 'Select a period of time to query its usage:'. A 'From:' label is followed by a text input field containing the date '2018-01-01'.

Private Cloud

Best Practices



The screenshot shows the OpenStack dashboard interface. The browser address bar displays `nebulia.ncse.illinois.edu`. The page title is "Instances - NSA Nebula OpenStack Cluster". The OpenStack logo is visible in the top left, and the user is logged in as "rb".

The main content area is titled "Instances" and features a search bar for "Instance Name" and a "Filter" button. There are also buttons for "Launch Instance" and "Terminate Instance".

The instances are listed in a table with the following columns: Instance Name, Image Name, IP Address, Size, Key Pair, Status, Availability Zone, Task, Power State, and Time since creation. The table contains five entries:

Instance Name	Image Name	IP Address	Size	Key Pair	Status	Availability Zone	Task	Power State	Time since creation
<input type="checkbox"/> Coursera	Ubuntu 16.04	192.168.100.95 Floating IPs: 141.142.211.171	m1.xlarge	ui-datascience	Active	ITS	None	Running	2016-11-10 14:44:10
<input type="checkbox"/> proxy	CentOS 7 latest	192.168.100.94 Floating IPs: 141.142.208.92	m1.large	accounting	Active	nova	None	Running	2016-11-10 14:44:10
<input type="checkbox"/> accy_grader	Ubuntu 16.04	192.168.100.90 Floating IPs: 141.142.209.166	m1.small	accounting	Active	nova	None	Running	3016-11-10 14:44:10
<input type="checkbox"/> info490_grader	Ubuntu 16.04	192.168.100.87 Floating IPs: 141.142.211.60	m1.small	accounting	Active	nova	None	Running	3016-11-10 14:44:10
<input type="checkbox"/> node1	CentOS 7 latest	192.168.100.82	n-rc1.large	accounting	Active	nova	None	Running	3016-11-10 14:44:10

Best Practices

The screenshot displays the AWS Management Console for the US East (Ohio) region. The main content area is titled "Resources" and lists the following EC2 resources:

- 8 Running Instances
- 0 Dedicated Hosts
- 8 Volumes
- 2 Key Pairs
- 0 Placement Groups
- 1 Elastic IPs
- 1 Snapshots
- 0 Load Balancers
- 7 Security Groups

A promotional banner for EC2 Spot instances is visible, stating: "EC2 Spot. Save up to 90% off On-Demand Prices. Turbo Boost your Workloads. Get started with Amazon EC2 Spot Instances."

The "Create Instance" section provides instructions on how to launch a virtual server and includes a "Launch Instance" button.

The "Service Health" section shows the status for the US East (Ohio) region, indicating that the service is operating normally.

The "Scheduled Events" section shows no events for the US East (Ohio) region.

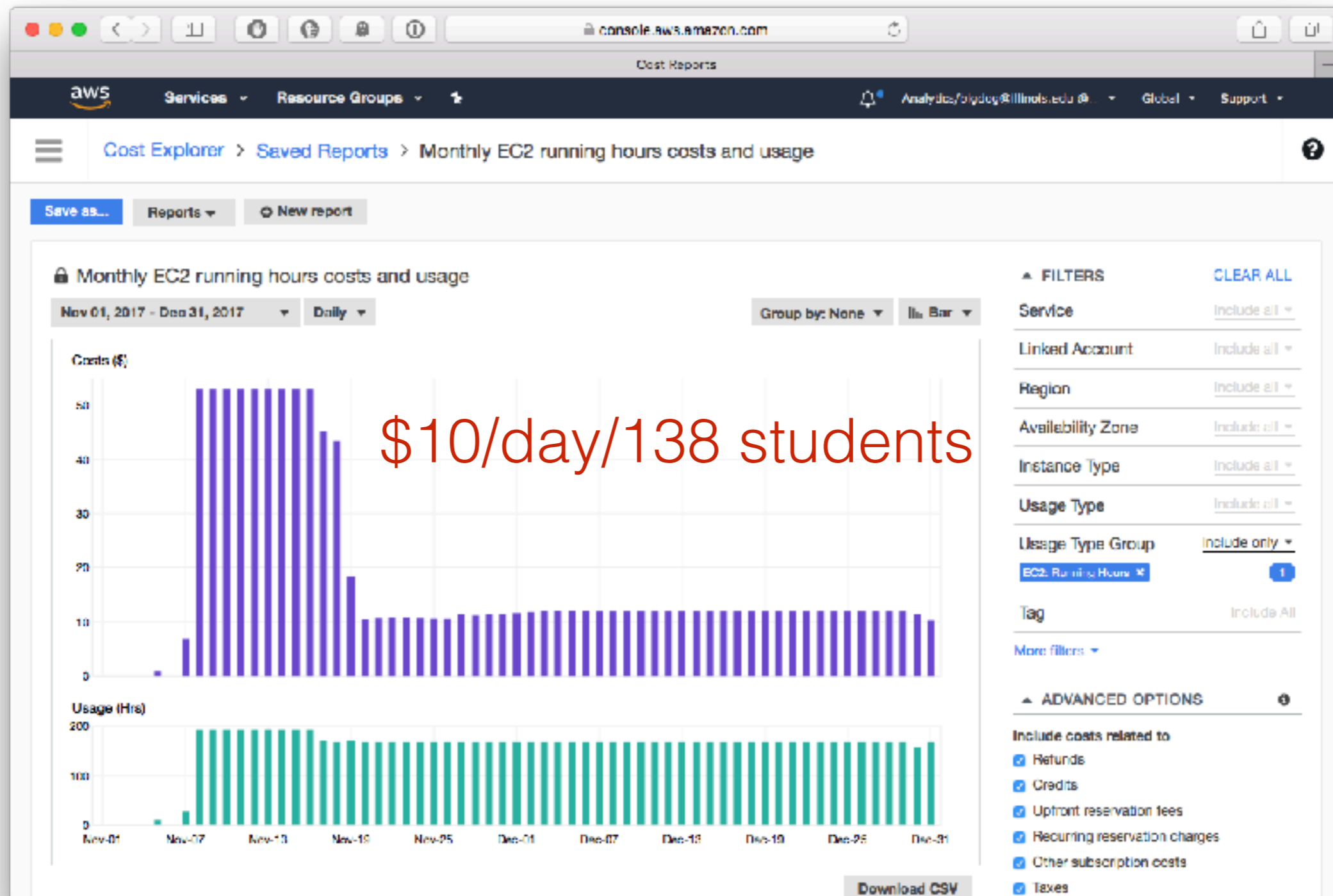
The "Account Attributes" section lists supported platforms (VPC), default VPC (vpc-df8c09b6), and resource ID length management.

The "Additional Information" section includes links to the Getting Started Guide, Documentation, All EC2 Resources, Forums, Pricing, and Contact Us.

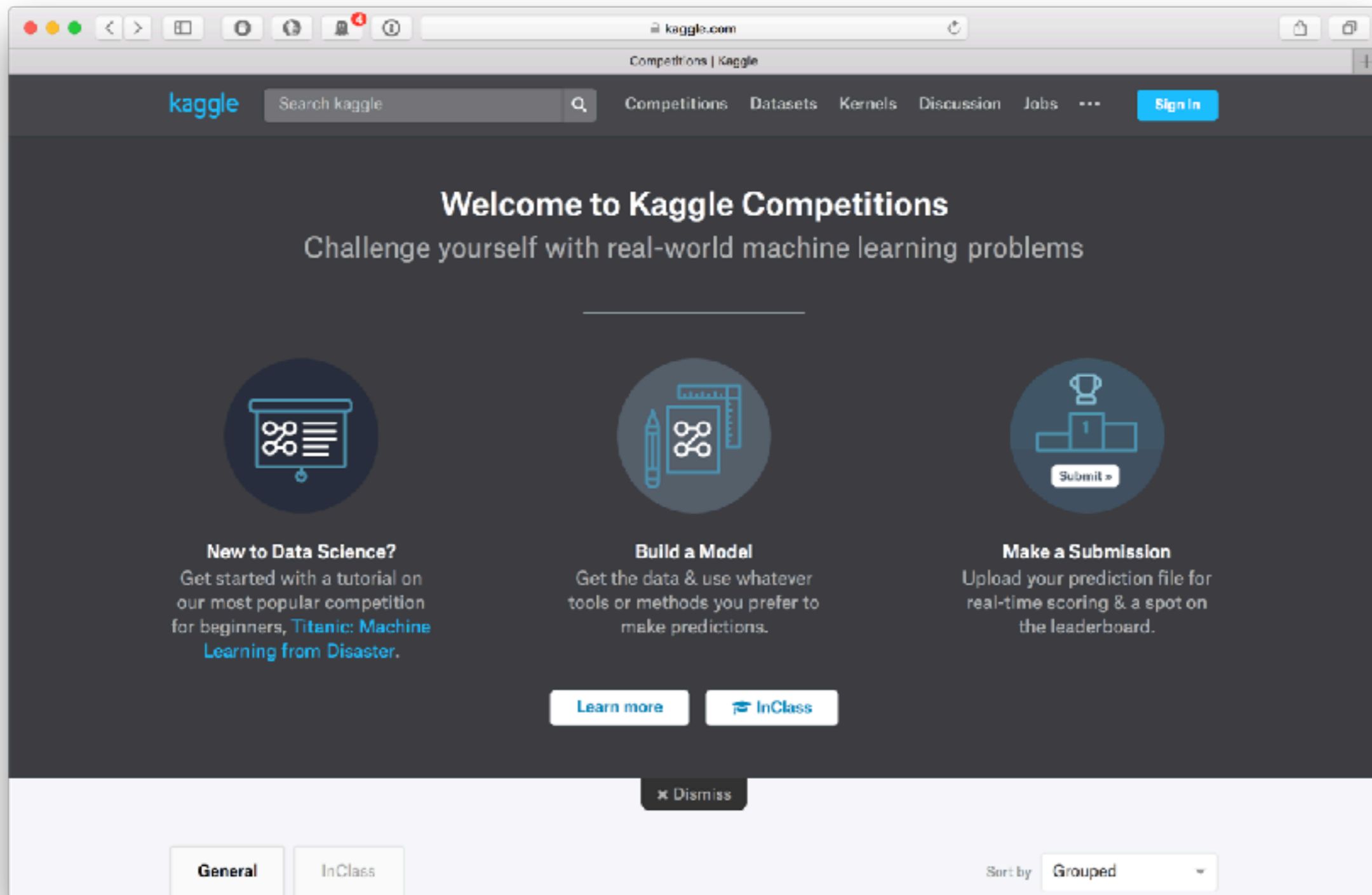
The "AWS Marketplace" section promotes free software trial products and lists popular AMIs, such as Barracuda NextGen Firewall F-Series - PAYG.

The footer contains the AWS logo, navigation links (Services, Resource Groups), user information (Analytics/bigdog@illinois.edu), region (Ohio), and support options. It also includes a feedback link, language selection (English (US)), and copyright information (© 2008 - 2018, Amazon Web Services, Inc. or its affiliates. All rights reserved. Privacy Policy Terms of Use).

Best Practices



Data + Ideas



Analytics in Research



Connect Faculty



Seminar
Conference



Podcast



Analytics
Training



INTERNATIONAL
VISITOR
PROGRAM

Research

Why should scientific results be reproducible? An explainer — NOVA Next | PBS

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NOVA NEXT

HOME | STORYLINES | ARCHIVE | ABOUT

Why Should Scientific Results Be Reproducible?

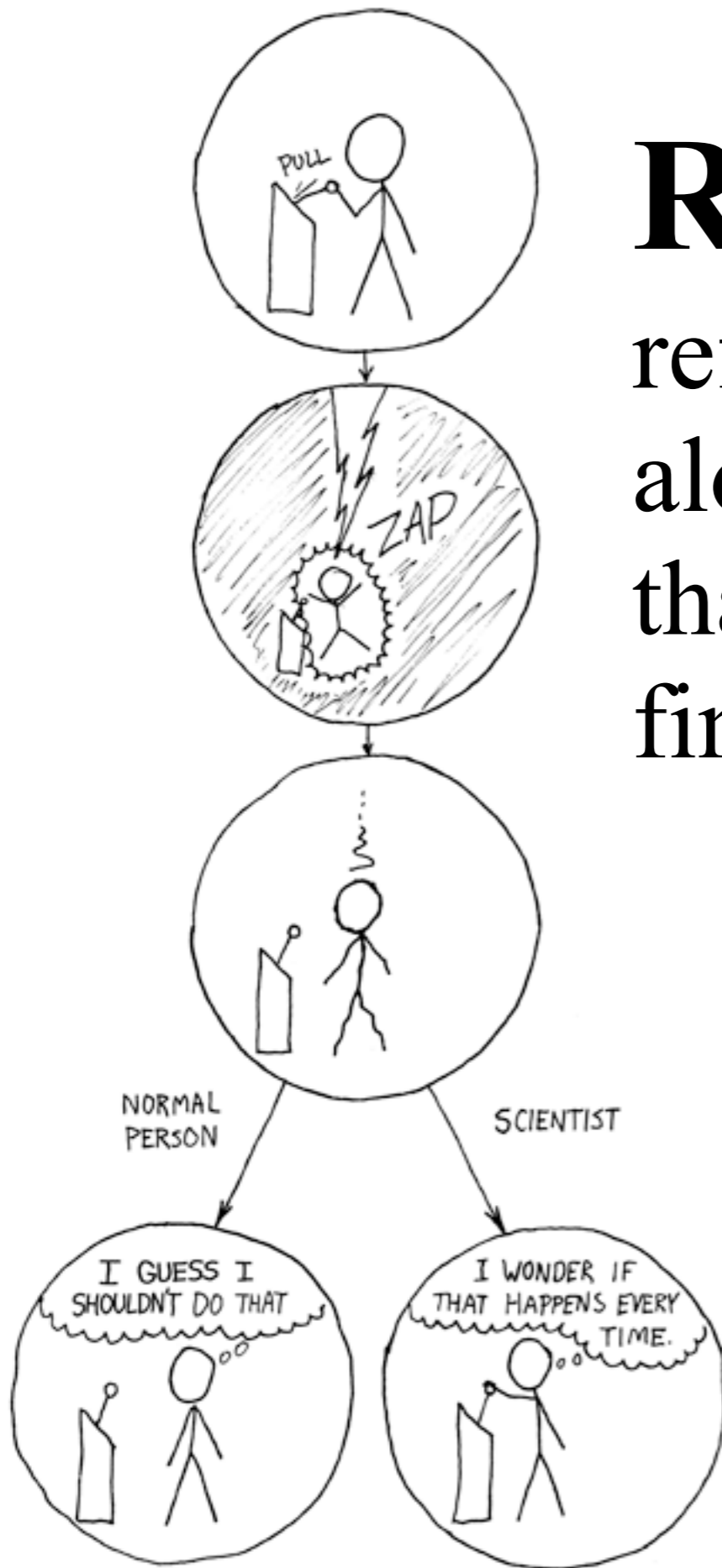
By Dakin Henderson on Thu, 19 Jan 2017

[Read Later](#) [Like](#) [Tweet](#)

Since 2005, when Stanford University professor John Ioannidis published his paper "Why Most Published Findings Are False" in *PLOS Medicine*, reports have been mounting of studies that are false, misleading, and/or irreproducible. Two major pharmaceutical companies each took a sample of "landmark" cancer biology papers and only were able to validate the findings of 6% and 11%, respectively. A

Reproducible research

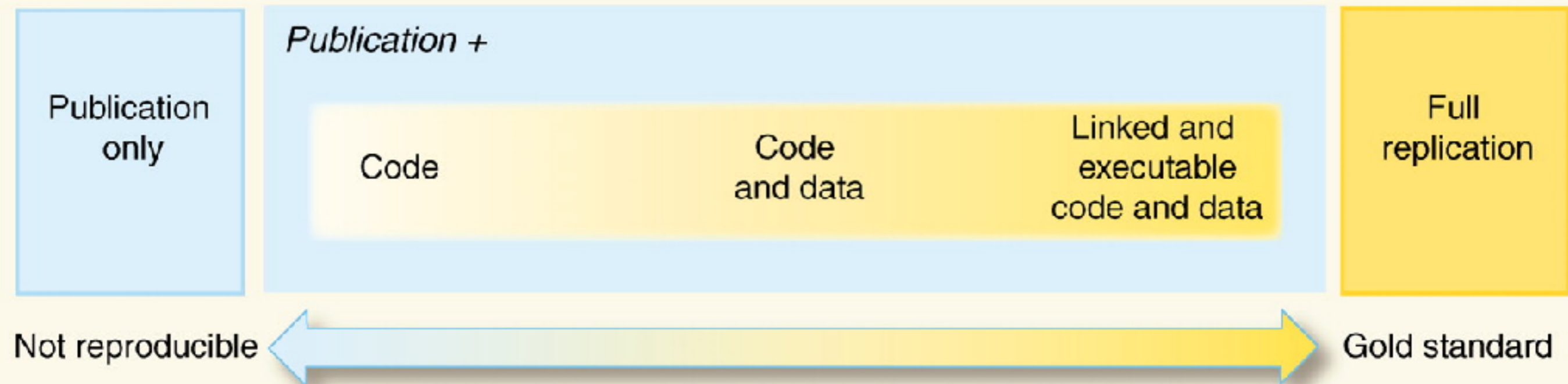
refers to analyses that are published along with their data and code so that others can easily verify the findings and build upon them.



Annual Report of the Office of
Economic Research, FY 2016

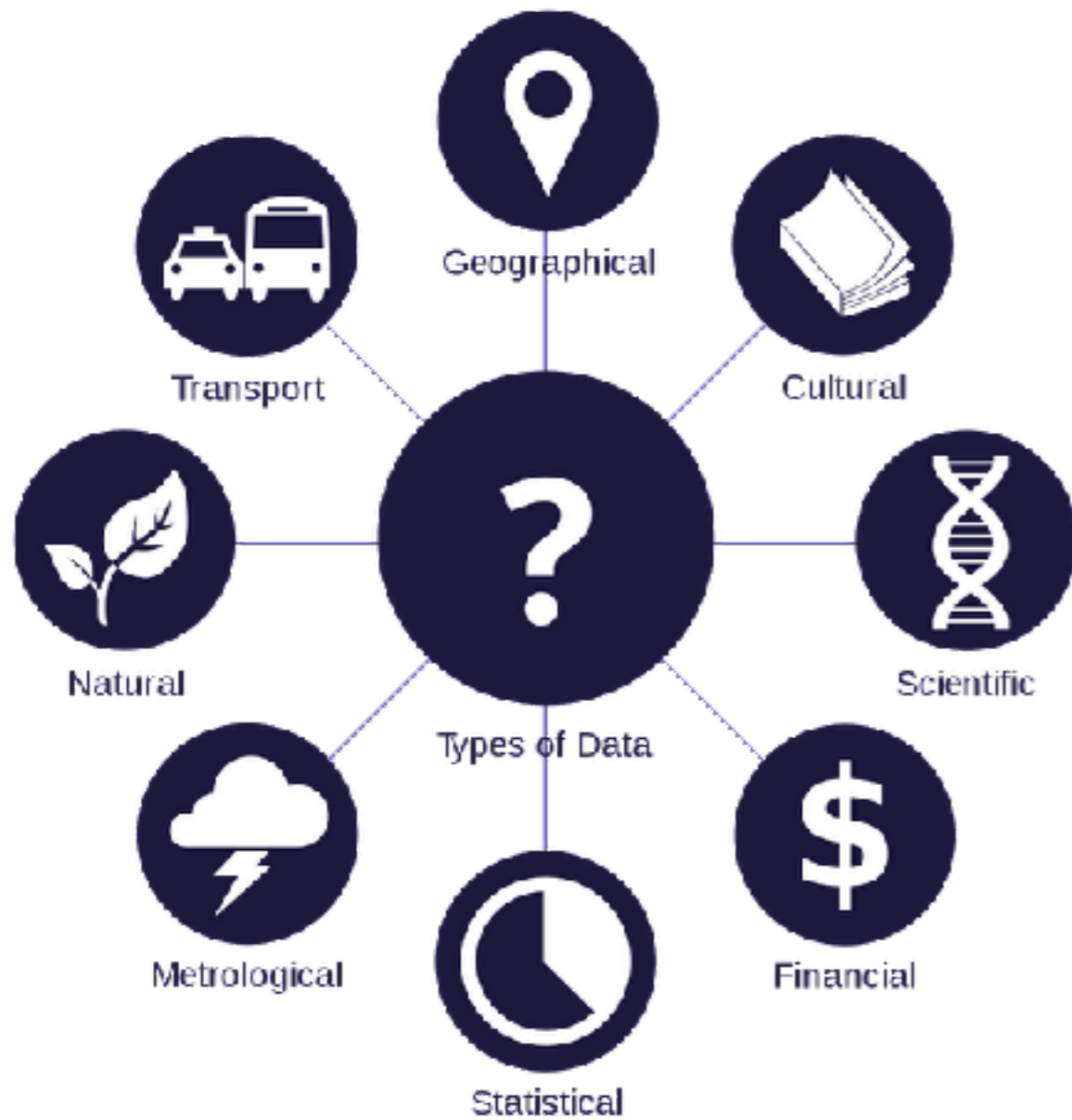
Reproducible Research

Reproducibility Spectrum

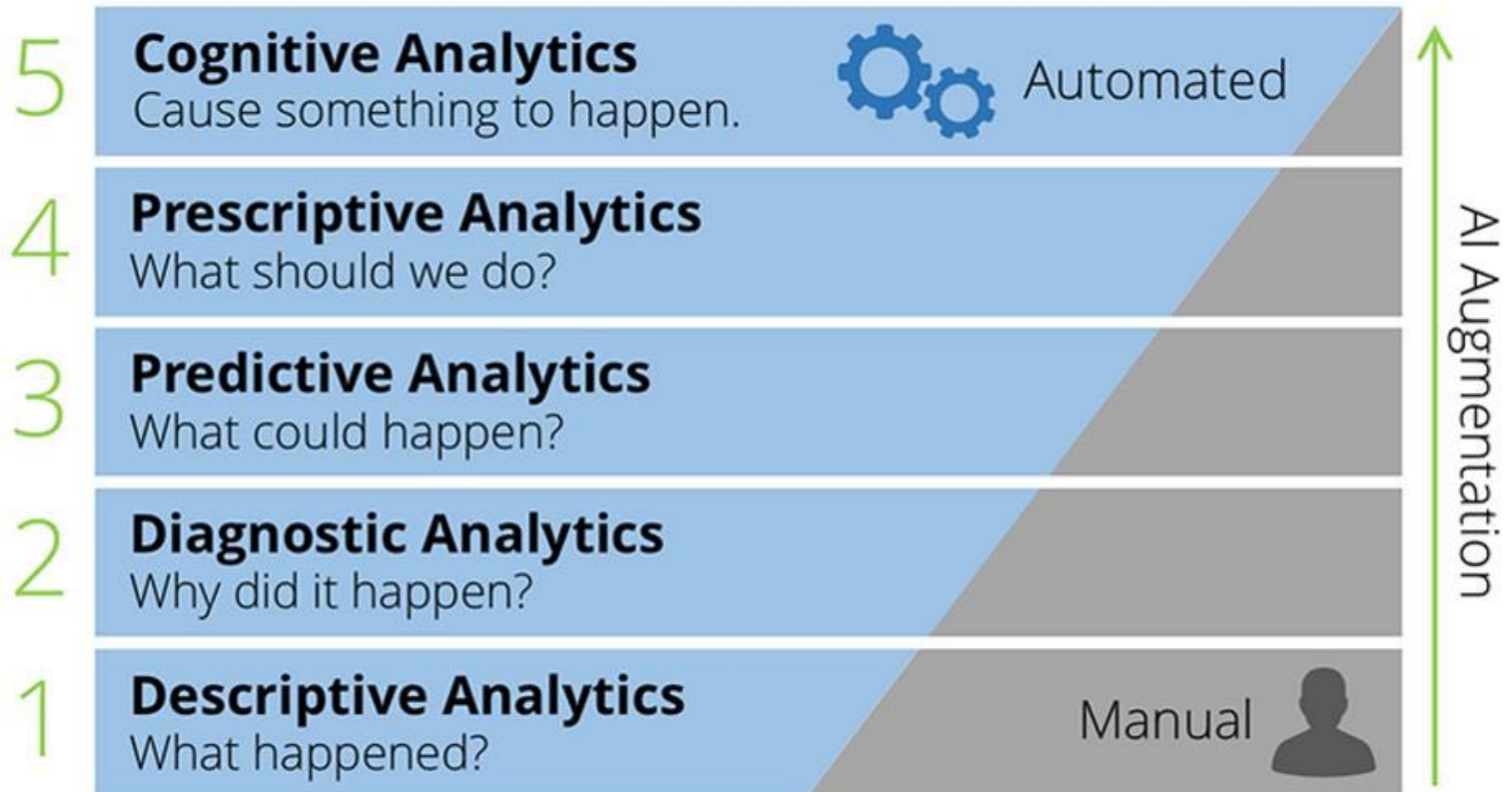


But how?

Reproducible Research



Innovations in Research

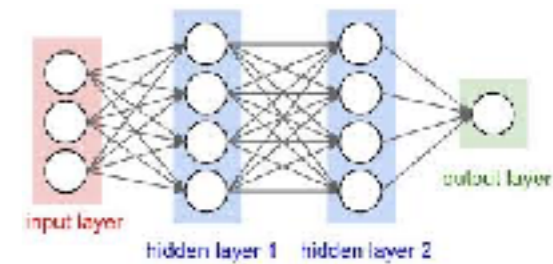
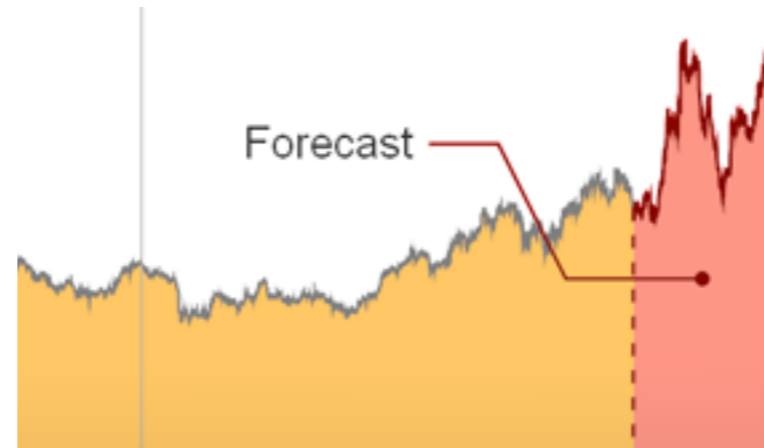
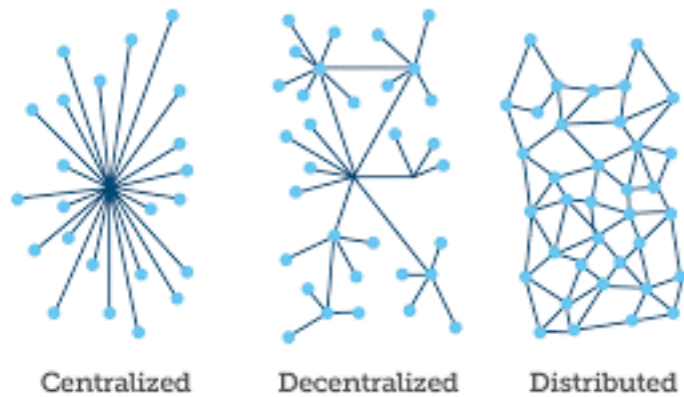
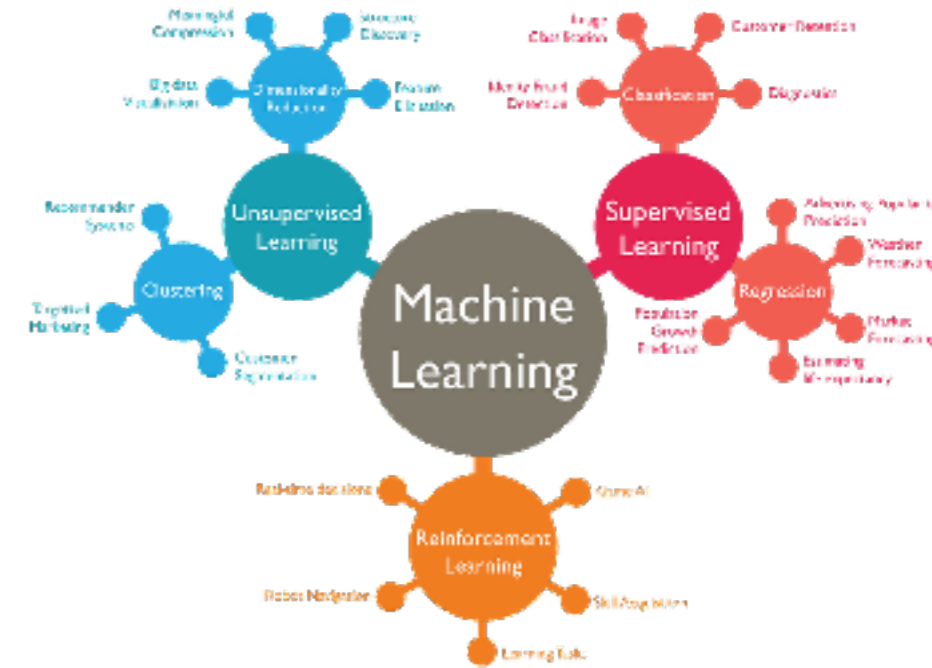
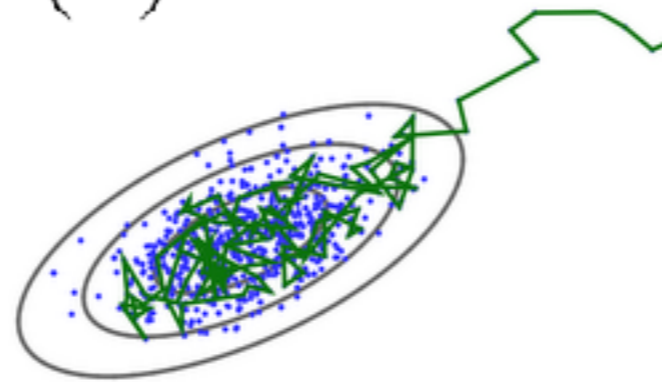


Innovations in Research

$$P(A | B) = \frac{P(B | A)P(A)}{P(B)}$$



PYMC3

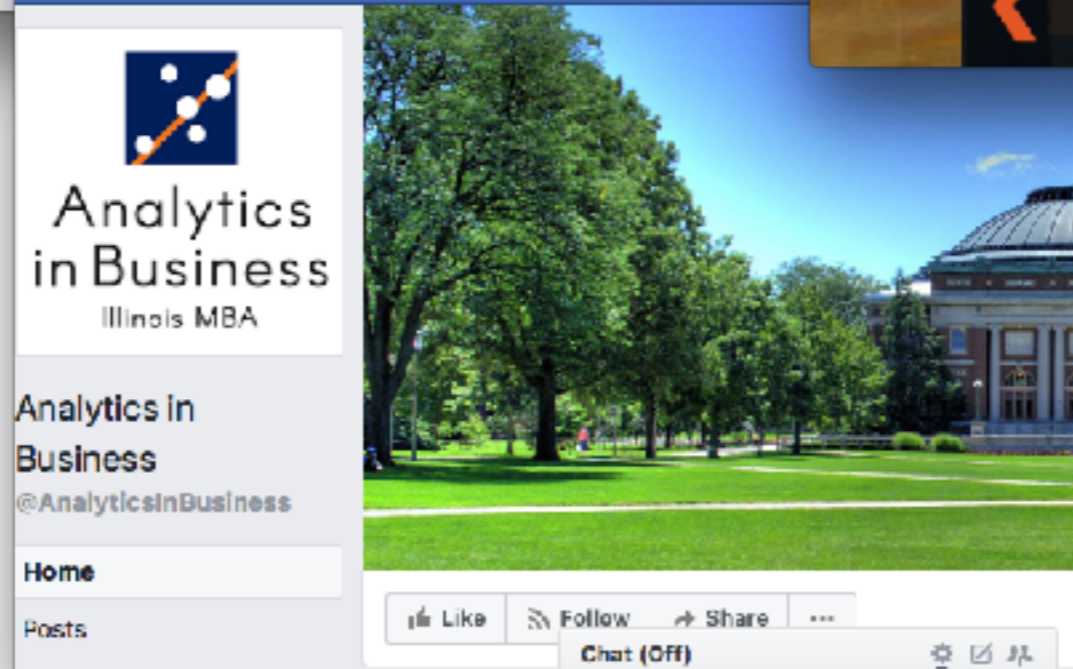
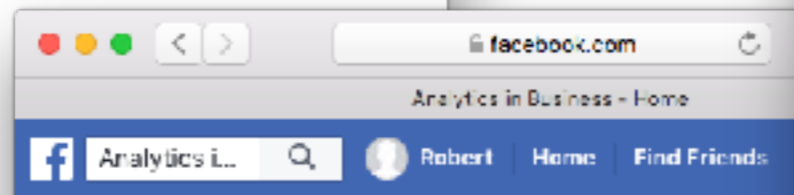
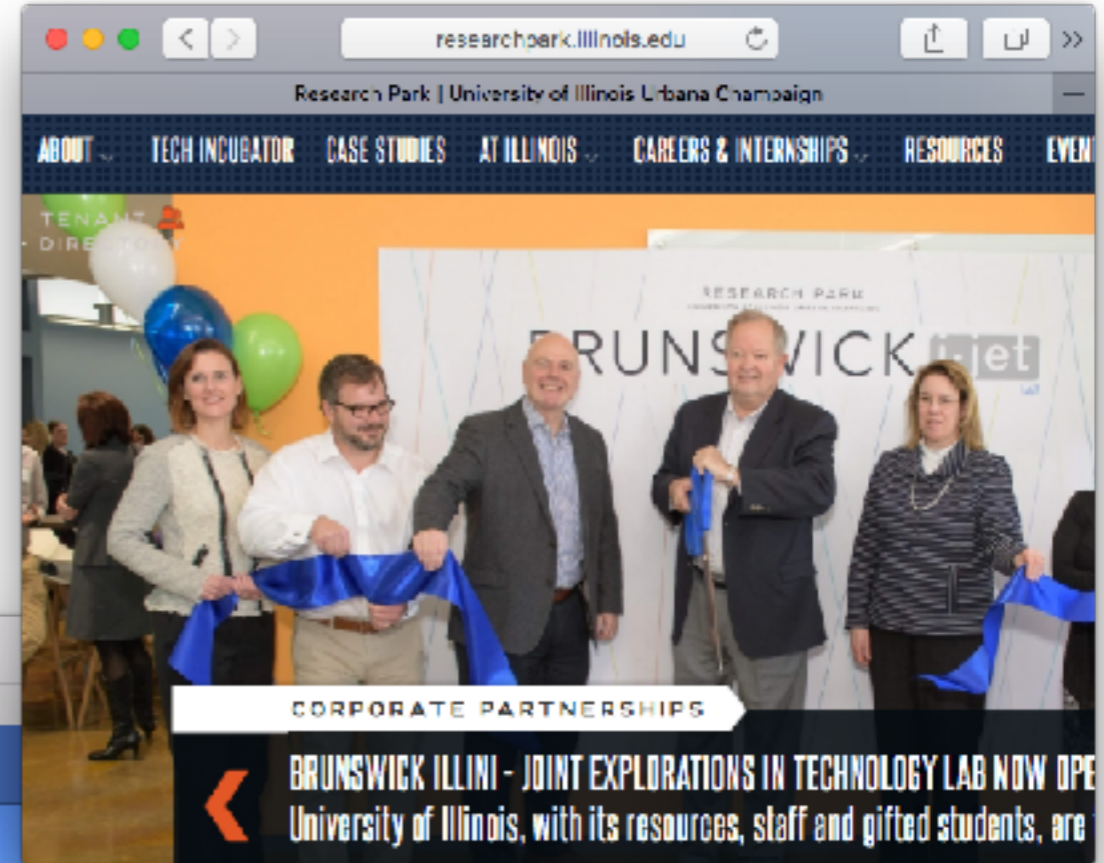


 **BLOCKCHAIN**

 **Keras**
 **TensorFlow™**



Engagement



JOHN DEERE



MONSANTO



Fellow Program

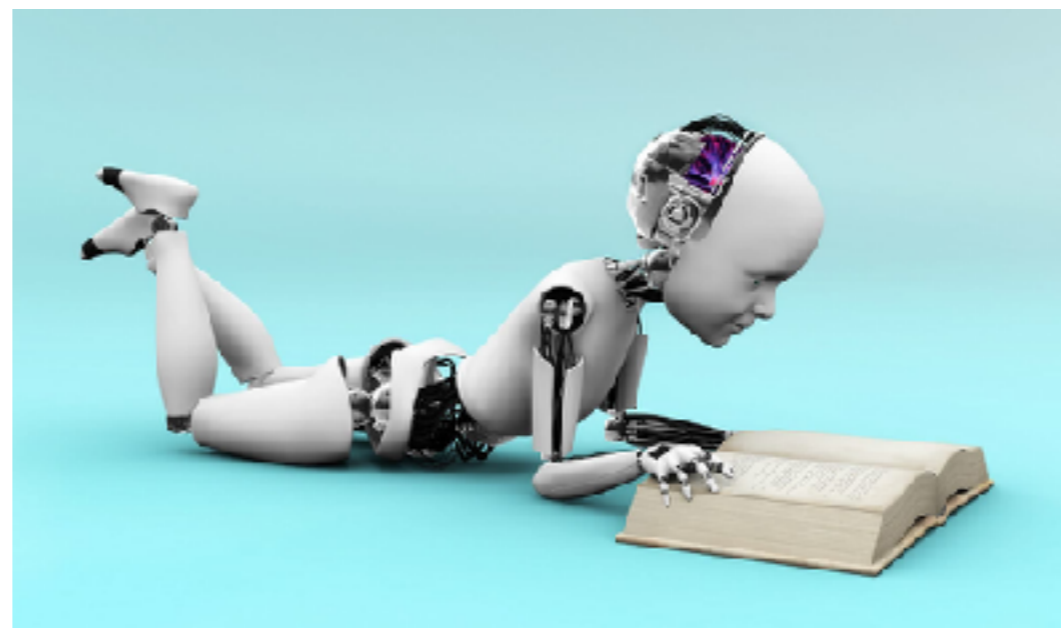
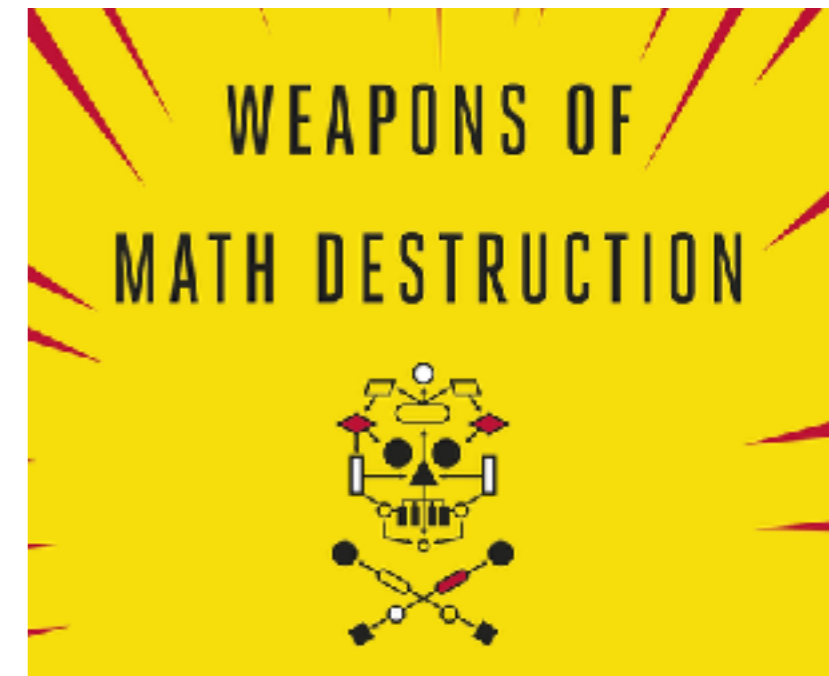


You can be here
UIDF-CBA Fellows

Ethics in ML

Center for Professional Responsibility in Business and Society
Center for Business Analytics

October 2018



Thank
you



How can you engage?