

ENABLE 2020: Building an Online Healthcare Data Analytics Training Program in the COVID-19 Era

Eric Cui, Fall 2020

BMHI Internship Presentation

ONLINE TRAINING MODULES



[Online Module Form](#)

[Zoom Office Hours](#)

[FAQs](#)

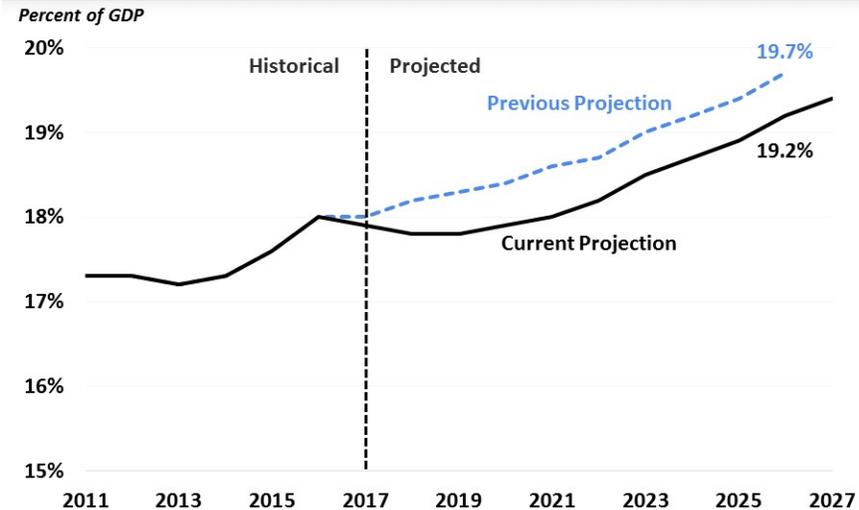
[Contact Us](#)

The [Carolina Health Informatics Program](#) (CHIP) has developed a few online training modules called *An Introduction to Data Science through a health care lens* to expose learners to the field of data science. These online modules are accessible to anyone who is interested, and require no prior training or knowledge in data science. The modules will be released on May 20th, 2020. If you complete the entire set of modules – the entire “short course” – and successfully pass a simple final assessment, you will receive a certificate of completion.

Rising Healthcare Demand

- Swelling population
- Graying population
- Increasing number of physician visits per patient

Health Spending is Lower But Still Growing in Current Outlook

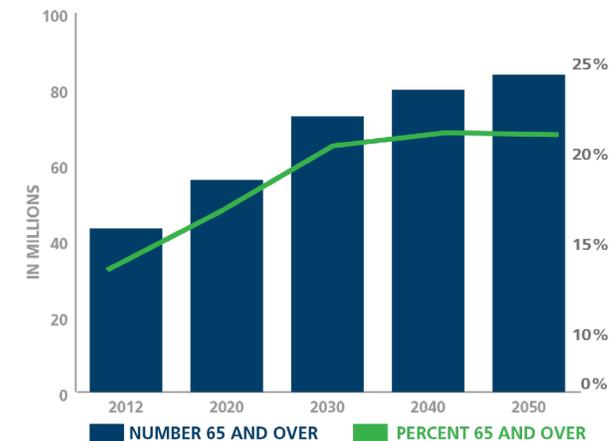


Source: Center for Medicare and Medicaid Services
Note: 2011-2016 numbers are actual data for both lines.



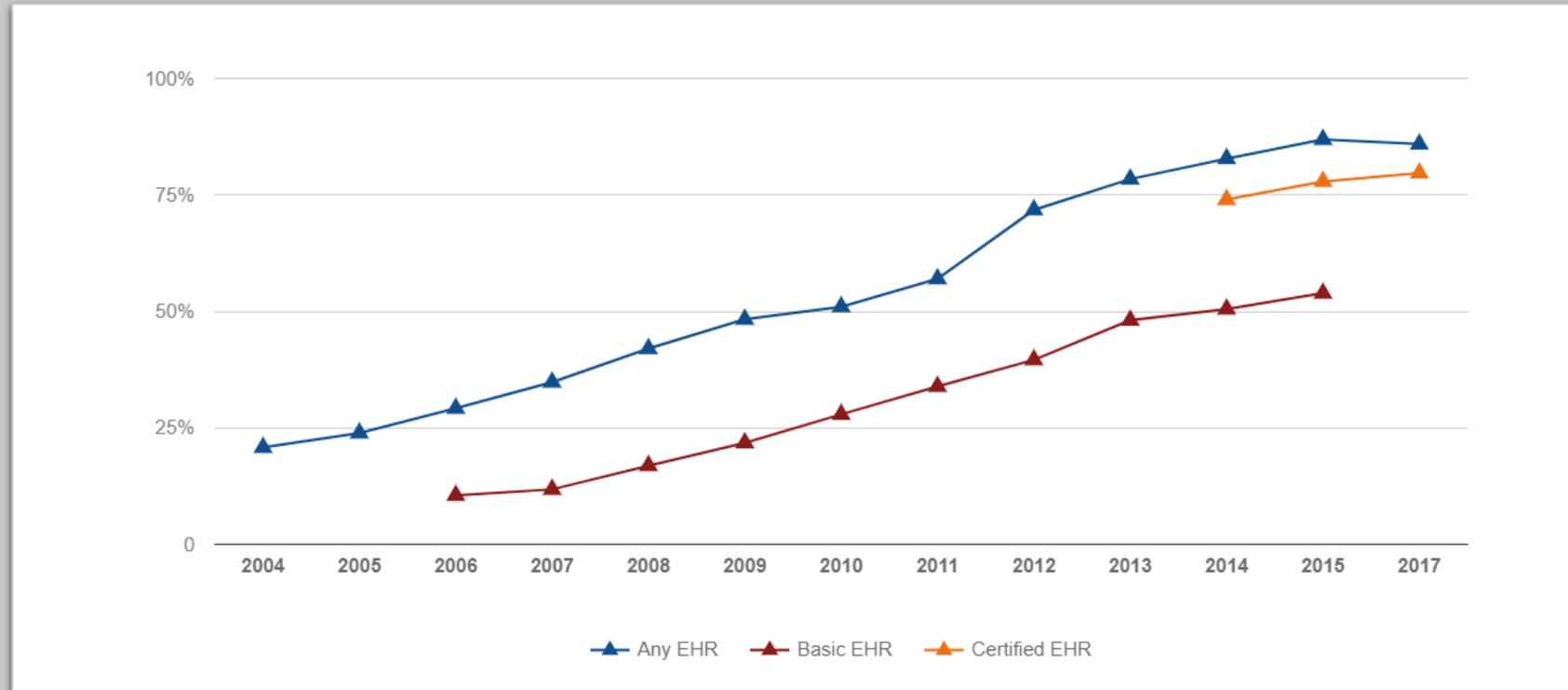
AGING US POPULATION

Source: US Census Bureau



Rising Demand for Health Informaticians

- 2013 analysis estimated that health IT job ads tripled as a share of healthcare job postings
- 2018 analysis estimated 19,852 – 153,115 more FTE personnel may be required



ENABLE History

- Established in 2018
- Partnership between United Health Foundation and the Carolina Health Informatics Program (CHIP)
- Program designed to train underrepresented students and professionals in biomedical and health informatics



THE UNIVERSITY
of NORTH CAROLINA
at CHAPEL HILL



HEALTH INFORMATICS,
DATA ANALYTICS
AND VISUALIZATION
(HIDAV) BOOT-CAMP
SUMMER 2019
CONTACT: SHIKHA
YADAV
ENABLE PROGRAM
COORDINATOR
ENABLE@UNC.EDU
919.962.2208



Word
distribul
in HBV

**GAIN A BROAD
INTRODUCTION TO
HEALTH DATA
ANALYSIS, DATA
VISUALIZATION,
ELECTRONIC HEALTH
RECORDS MANAGEMENT,
HUMAN-COMPUTER
INTERACTION AND
LEADERSHIP SKILLS**

ENABLE Program Goals



“Creation of in-person summer boot camps for minority undergraduate students from local HBCUs to expose students to health informatics principles and encourage them to explore advanced training and health informatics careers.”



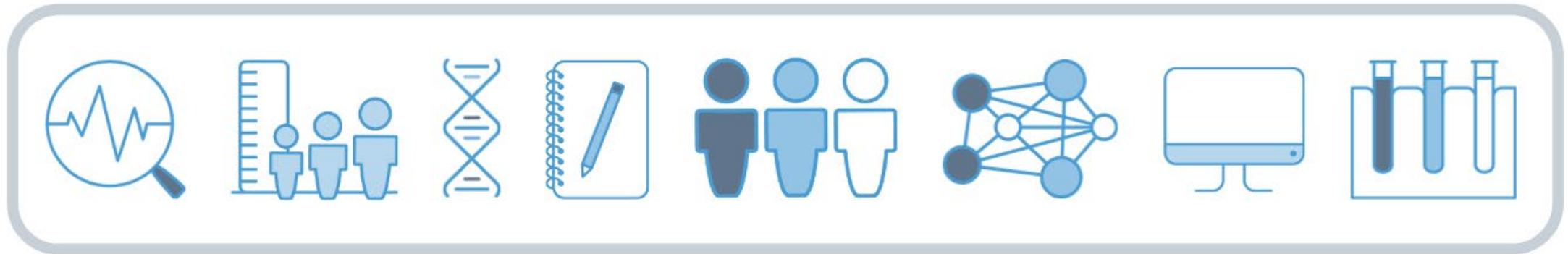
“Development of new health informatics online course content, based upon the boot camps, that introduces health informatics to a cross-section of students and working professionals.”



“Creation of a new online master’s degree to help working professionals develop expertise in health informatics, with a focus on data analytics, visualizations, statistics and database systems.”

COVID-19 and ENABLE

- In-person program cancelled due to COVID-19
- Program transitioned to online modules
- Modules developed in partnership with Program for Precision Medicine in Healthcare



ENABLE Program Goals



“Creation of in-person summer boot camps for minority undergraduate students from local HBCUs to expose students to health informatics principles and encourage them to explore advanced training and health informatics careers.”



“Development of new health informatics online course content, based upon the boot camps, that introduces health informatics to a cross-section of students and working professionals.”



“Creation of a new online master’s degree to help working professionals develop expertise in health informatics, with a focus on data analytics, visualizations, statistics and database systems.”

Introduction to Data Science Curriculum

Text Mining

- ▶ Module 1: Text Preprocessing
- ▶ Module 2: Exploratory Analysis of Text Data
- ▶ Module 3: Information Extraction
- ▶ Module 4: Feature Representation for Text
- ▶ Module 5: Predictive Analysis of Text Data

Data Mining

- ▶ Module 1: Preparing Data
- ▶ Module 2: Univariate Analysis
- ▶ Module 3: Bivariate Analysis
- ▶ Module 4: Feature Selection
- ▶ Module 5: Predictive Analysis



To receive a certificate of completion, please complete the final quiz. The quiz comprises of questions from all the text mining and data mining modules. Please complete the final quiz only after you have completed all the modules. You will receive the final score after we have finished reviewing your answers.

[Final Quiz](#)



Certificate



Text Mining Project

Use your skills to analyze text and produce relevant insights. Possible dataset topics include drug reviews, health news, COVID-19 tweets, and conversational search.

[Open Project Notebook](#)



Data Mining Project

Use your skills to analyze a healthcare dataset and produce relevant insights. Possible dataset topics include stroke, diabetes, and heart disease prediction.

[Open Project Notebook](#)

Longitudinal Approach

1) Reading and Preparing Data

2) Univariate Analysis

3) Bivariate Analysis

4) Feature Selection

5) Predictive Analysis



Module Contents

Lecture video

Instructional text and multimedia

Interactive code

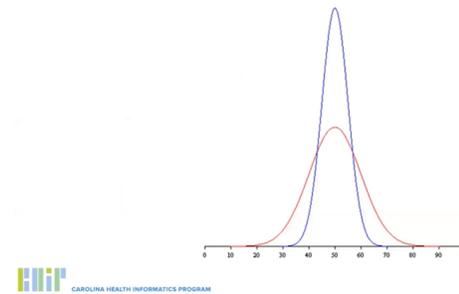
Questions with immediate feedback

Hands-on exercises

Active Learning

- Active learning includes:
 - Problem-based or case-based learning
 - Cooperative learning
 - Think-pair-share
 - Inquiry-based learning
 - Discovery learning
 - Technology-enhanced learning

Variability



MULTIPLE CHOICE QUESTION

A critical part of any clinical experiment is understanding your patients. Say we have a 10 patient cohort with the following ages in years below.

18, 38, 53, 27, 68, 44, 86, 63, 54, 68

What is the appropriate summary statistics to calculate for this group?

- Median
- Frequency
- Mean
- Percentage
- None of the above

Write your code below and push the "Run" button in the tool bar of the Jupyter Notebook to see the result.

In []:

Hide Solution

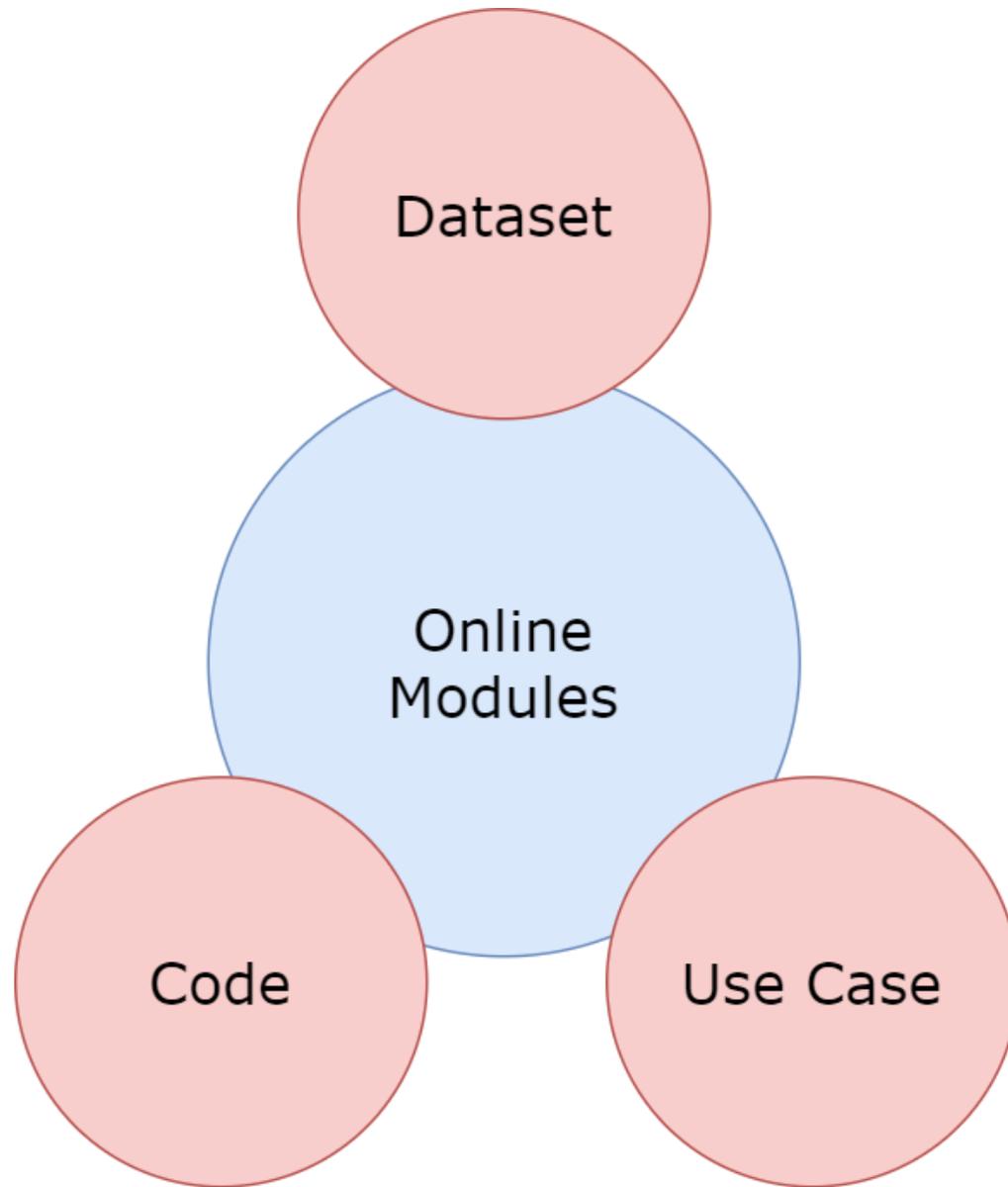
Suggested Answer

```
In [ ]: # "Show Solution" Toggle
text = "We measured the serum lipid profile, together with plasma fibrinogen and serum lipoprotein
rm_sc = remove_special_characters(text)
rm_sw = remove_stopwords(rm_sc)
final_text = lemmatize_text(rm_sw)

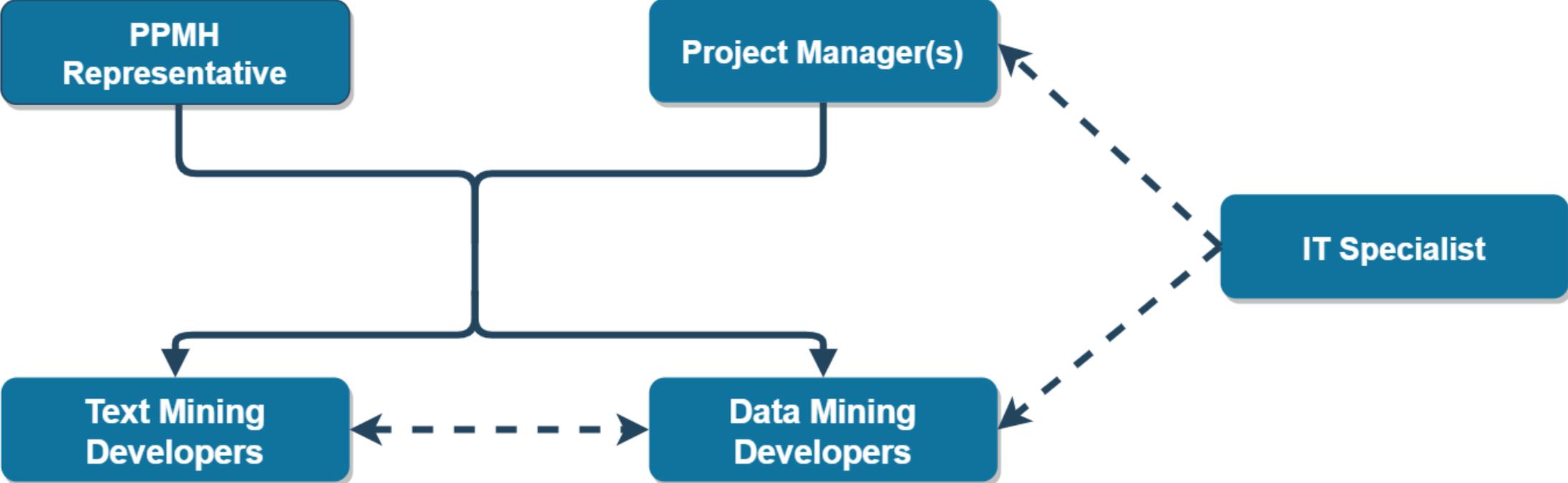
print(final_text)
# executed in 10ms, finished 07:57:21 2020-05-20
```



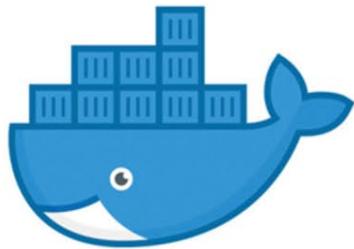
Data Mining Project



Team Structure



Server

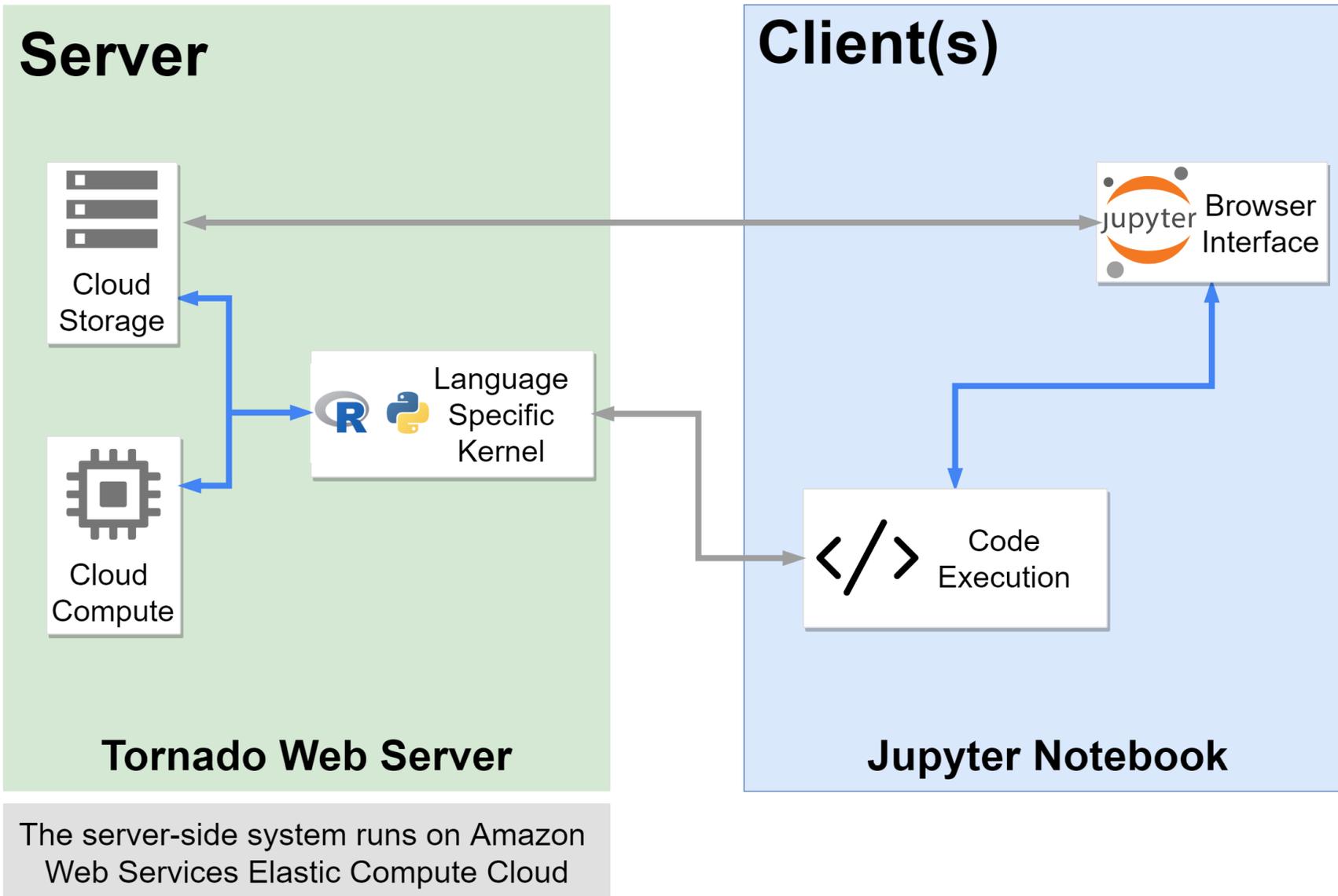


Content Management



Content Development





Implementation



Introduction to Data Science Curriculum

Text Mining	Data Mining
<ul style="list-style-type: none">▶ Module 1: Text Preprocessing▶ Module 2: Exploratory Analysis of Text Data▶ Module 3: Information Extraction▶ Module 4: Feature Representation for Text▶ Module 5: Predictive Analysis of Text Data	<ul style="list-style-type: none">▶ Module 1: Preparing Data▶ Module 2: Univariate Analysis <p>Univariate analysis allows you to deeply analyze a single variable. This module will teach you the skills to perform univariate analysis including variable types, summary statistics, and univariate data visualization. Along the way, you'll learn by analyzing specific variables from real patient data!</p> <p>Begin Module</p> <ul style="list-style-type: none">▶ Module 3: Bivariate Analysis▶ Module 4: Feature Selection▶ Module 5: Predictive Analysis

Introduction to Data Science Projects

redicting Stroke (Python) Last Checkpoint: 2 minutes ago (unsaved changes)



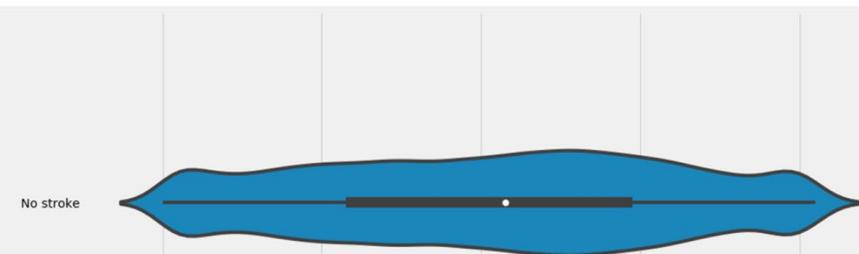
There does not appear to be any extreme age values or prominent age clusters. Now let's see if there's a relationship between stroke status and age.

Do you expect there to be a relationship between stroke status and age? Why? Keep your answer in mind before seeing the output below.

```
82]: plt.figure(figsize=(15,15))
ns.violinplot(y=stroke_data.stroke,x=stroke_data.age,orient='h')
print('The dots in the center of violin plots represent median age of each group')
```

executed in 442ms, finished 02:35:41 2020-10-07

The dots in the center of violin plots represent median age of each group



Program Outcomes

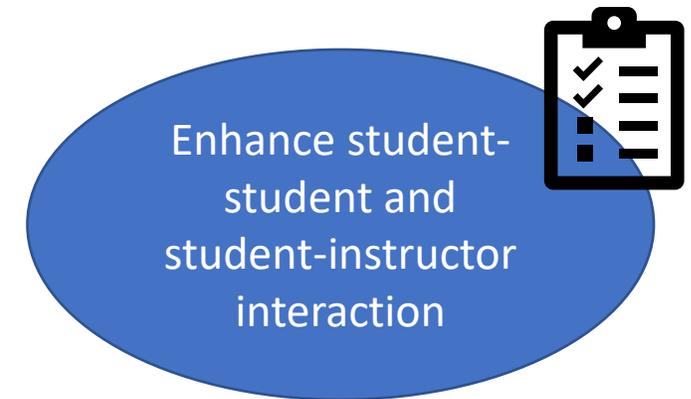
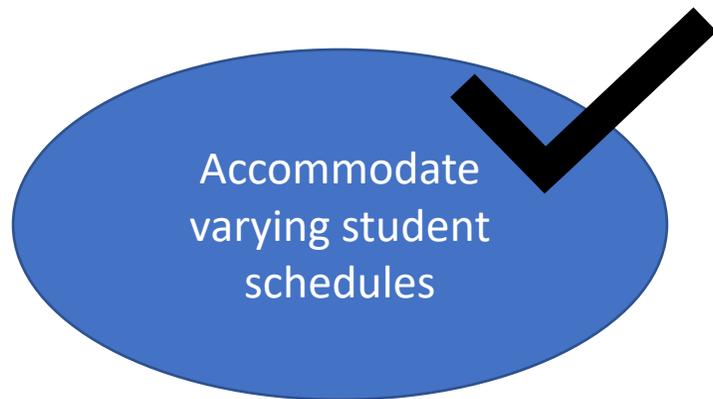
165 students
expressed interest

8-10 students joined
office hours

17 students
completed program

Comparison to MOOC Performance

- 2013 analysis estimates 7.5% MOOC completion rate
- Survey of MOOC courses found completion rates ranging from 0.9% - 36.1%
- Summer completion rate was approximately 10%



Lessons Learned

- Interdisciplinary expertise is important
- Minimize barriers to entry
- Emphasize clear and simple user interfaces

Conclusion

Thank you! Any questions?



References

1. Patlak, M., & Levit, L. A. (2009). *Ensuring quality cancer care through the oncology workforce sustaining care in the 21st century ; workshop summary*. Washington, DC: National Acad. Press.
2. Health Spending Outlook Shows Faster Growth Ahead. (2019, March 07). Retrieved November 01, 2020, from <http://www.crfb.org/blogs/health-spending-outlook-shows-faster-growth-ahead>
3. Office of the National Coordinator for Health Information Technology. 'Office-based Physician Electronic Health Record Adoption,' Health IT Quick-Stat #50. <http://dashboard.healthit.gov/quickstats/pages/physician-ehr-adoption-trends.php>.
4. Hersh, W. R., Boone, K. W., & Totten, A. M. (2018). Characteristics of the healthcare information technology workforce in the HITECH era: Underestimated in size, still growing, and adapting to advanced uses. *JAMIA Open*, 1(2), 188-194. doi:10.1093/jamiaopen/ooy029
5. Schwartz, A., Magoulas, R., & Buntin, M. (2013). Tracking Labor Demand with Online Job Postings: The Case of Health IT Workers and the HITECH Act. *Industrial Relations: A Journal of Economy and Society*, 52(4), 941-968. doi:10.1111/irel.12041
6. UNC and United Health Foundation launch partnership to train and diversify next generation of health data experts. (2018, January 23). Retrieved November 01, 2020, from <https://sil.unc.edu/news/2018/chip-enable>
7. Michael, J. (2006). Where's the evidence that active learning works? *Advances in Physiology Education*, 30(4), 159-167. doi:10.1152/advan.00053.2006\
8. Thistlethwaite JE, Davies D, Ekeocha S, Kidd JM, Macdougall C, Matthews P, et al. The effectiveness of case-based learning in health professional education. A BEME systematic review: BEME Guide No. 23. *Medical Teacher*. 2012Nov;34(6)
9. Ben Graffam (2007) Active learning in medical education: Strategies for beginning implementation, *Medical Teacher*, 29:1, 38-42, DOI: 10.1080/01421590601176398
10. Khalil, H. & Ebner, M. (2014). MOOCs Completion Rates and Possible Methods to Improve Retention - A Literature Review. In J. Viteli & M. Leikomaa (Eds.), *Proceedings of EdMedia 2014--World Conference on Educational Media and Technology* (pp. 1305-1313). Tampere, Finland: Association for the Advancement of Computing in Education (AACE).
11. Bruff, D. (2013, August 19). Lessons Learned from Vanderbilt's First MOOCs. Retrieved October 30, 2020, from <https://cft.vanderbilt.edu/2013/08/lessons-learned-from-vanderbilts-first-moocs/>
12. Jordan, K. (2013). MOOC Completion Rates: The Data, Retrieved October 30, 2020, available at <http://www.katyjordan.com/MOOCproject.html>
13. Belanger, Yvonne; & Thornton, Jessica (2013). Bioelectricity: A Quantitative Approach Duke University's First MOOC. Retrieved from <https://hdl.handle.net/10161/6216>.