ADHD Study

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DSC 680 Applied Data Science

GitHub Portfolio URL: https://github.com/Holly-E/ADHD_Study

Which Domain?

What domain is this data going to come from? Please list 10 references (with a brief annotation) to use to make sense of what you're doing with these data.

The domain will be Attention Deficit-Hyperactivity Disorder (ADHD).

References:

1. Birnbaum HG, Kessler RC, Lowe SW, et al. "*Costs of attention deficit-hyperactivity disorder (ADHD) in the US: excess costs of persons with ADHD and their family members in 2000."* Curr Med Res Opin. 2005;21(2):195-206. doi:10.1185/030079904X20303. Retrieved from https://pubmed.ncbi.nlm.nih.gov/15801990/?from_single_result=Costs+of+attention+deficit+disorder+AND+%28ADHD%29+AND+in+the+U.S.+%3A+Excess+costs+of+persons+with+ADHD+and+their+family+members+in+2000

   A comprehensive estimate of the cost of ADHD by considering the healthcare and work loss costs of persons with ADHD, as well as those costs imposed on their family members.

2. Castellanos FX, Lee PP, Sharp W, et al. *"Developmental Trajectories of Brain Volume Abnormalities in Children and Adolescents With Attention-Deficit/Hyperactivity Disorder."* JAMA. 2002;288(14):1740–1748. doi:10.1001/jama.288.14.1740 Retrieved from https://jamanetwork.com/journals/jama/article-abstract/195386

   Compares regional brain volumes at initial scan and their change over time in medicated and previously unmedicated male and female patients with ADHD and healthy controls.

3. Chadd. *"ADHD and Long-Term Outcomes."* Retrieved June, 2020 from https://chadd.org/about-adhd/long-term-outcomes/

   Examines the long term outcomes of ADHD, including educational and occupational.

4. Chadd. *"The Science of ADHD*." Retrieved June, 2020 from https://chadd.org/about-adhd/the-science-of-adhd/

   Discusses the neurochemistry behind ADHD and executive functioning.

5. FiveThirtyEight. (Sept 19, 2014) *"How Many Adults Take ADHD Drugs?"* Retrieved from https://fivethirtyeight.com/features/dear-mona-how-many-adults-take-adhd-drugs/

   Data presented on how common it is for adults to take ADHD drugs like Ritalin, Adderall, Concerta, etc., and what are some things we know about these adults who are.

6. Guilherme Polanczyk, M.D., Maurício Silva de Lima, M.D., et al. *"The Worldwide Prevalence of ADHD: A Systematic Review and Metaregression Analysis."* American Journal of Psychiatry 2007 164:6, 942-948. Retrieved from https://ajp.psychiatryonline.org/doi/full/10.1176/ajp.2007.164.6.942

   The worldwide prevalence estimates of attention deficit hyperactivity disorder (ADHD)/hyperkinetic disorder (HD) are highly heterogeneous. Presently, the reasons for this discrepancy remain poorly understood. The purpose of this study was to determine the possible causes of the varied worldwide estimates of the disorder and to compute its worldwide-pooled prevalence.

7. MASON, O. and ROSIER, T. (Feb 18, 2020). *"WHAT CAUSES ADHD? Face It — People with ADHD Are Wired Differently."* Retrieved from https://www.additudemag.com/current-research-on-adhd-breakdown-of-the-adhd-brain/

   An in-depth breakdown of the latest discoveries and the current research on the ADHD brain.

8. Philip Shaw, Mary Gilliam, et al. *"Cortical Development in Typically Developing Children With Symptoms of Hyperactivity and Impulsivity: Support for a Dimensional View of Attention Deficit Hyperactivity Disorder."* American Journal of Psychiatry 2011 168:2, 143-151. Retrieved from https://ajp.psychiatryonline.org/doi/full/10.1176/appi.ajp.2010.10030385

   They examine whether a slower rate of cortical thinning during late childhood and adolescence, which they previously found in ADHD, is also linked to the severity of symptoms of hyperactivity and impulsivity in typically developing children.

9. Philip Shaw, Argyris Stringaris, Joel Nigg, and Ellen Leibenluft. *"Emotion Dysregulation in Attention Deficit Hyperactivity Disorder."* American Journal of Psychiatry 2014 171:3, 276-293. Retrieved from https://ajp.psychiatryonline.org/doi/pdf/10.1176/appi.ajp.2013.13070966

   Emotion dysregulation is prevalent in ADHD throughout the lifespan and is a major contributor to impairment. This article examines motion dysregulation in ADHD arising from deficits in orienting toward, recognizing, and/or allocating attention to emotional stimuli. While current treatments for ADHD often also improves emotion dysregulation, a focus on this combination of symptoms reframes clinical questions and could stimulate novel therapeutic approaches.

10. U.S. EPA Office of Research and Development. (Jan 18, 2020). *"Childhood Chemical Exposures and ADHD."* Retrieved from https://catalog.data.gov/dataset/childhood-chemical-exposures-adhd

    A systematic review and meta-analysis examining the interrelationships between chemical and non-chemical stressors and inherent characteristics in children with ADHD.

Which Data?

What is the dataset you'll be examining? Please provide a codebook if there is one or a link to the dataset as well as a detailed description.

Data Source. 2011 - 2012 National Survey of Children's Health:
ftp://ftp.cdc.gov/pub/Health_Statistics/NCHS/slaits/nsch_2011_2012/

CDC's National Center for Health Statistics (NCHS), State and Local Area Integrated Telephone Survey program conducted this survey. In their landline and cell samples, a total of 847,881 households in the 50 states and DC were screened for age-eligible children (0 - 17 years old at the time of call).

The dataset is the results of the completed 95,677 detailed child-level interviews. The number of children with completed interviews per state ranged from 1,811 (South Dakota) to 2,200 (Texas) in the combined sample. Each record contains all interview data for the child and the household in which the child resides, including the child's health and health care, family functioning, parental health, neighborhood and community characteristics, health insurance coverage, and demographics.

The goals of the survey include assessing the physical and emotional health of children, as well as factors that may relate to child well-being, including medical homes, family interactions, parental health, school and after-school experiences, and neighborhood characteristics. For currently uninsured children, collect detailed information about the reasons why they are uninsured, including past enrollment and application information for public health insurance programs. Questions include age at first diagnosis for the following conditions: Intellectual disability; cerebral palsy; ADD/ADHD; behavioral or conduct problems; autism or Autism Spectrum Disorder (ASD).

Survey questions used to obtain the variables available here:
https://www.cdc.gov/nchs/data/slaits/2011NSCHQuestionnaire.pdf

Background and FAQ of data attached.

Research Questions? Benefits? Why analyze these data?

How are you proposing to analyze this dataset?

I am helping a friend who is starting a non-profit that offers ADHD coaching and support. There is a lot of misinformation in the public about ADHD, so it is helpful to analyze and understand

predictors of ADHD in order to help with diagnosis and treatment. We will seek to examine potential sub-groups of people with ADHD, as symptoms may present differently which can lead to undiagnosed individuals, or individuals who do not receive a diagnosis until well into adulthood.

I will analyze the dataset by classification (subject has ADHD or does not) and by determining subgroups using unsupervised learning.

What Method?

What methods will you be using? What will those methods provide in terms of analysis? How is this useful?

I will begin with exploratory data analysis, including a correlation matrix with other variables in the dataset. This will help us visualize potential relationships among the variables. I will prepare a model that includes a binary classification algorithm to predict whether an individual has ADHD. I will also use an unsupervised clustering technique to find similarities in the data points that do have ADHD and group similar data points together.

Potential Issues?

What challenges do you anticipate having? What could cause this project to go off schedule?

Challenges include feature selection to avoid redundant features and data leakage. A model that makes poor predictions would be the number one cause of this project going off schedule.

Concluding Remarks

Tie it all together. Think of this section as your final report's abstract.

ADHD is a neurodevelopmental disorder affecting 11 percent of school-age children, with symptoms continuing into adulthood in more than three-quarters of cases. Without identification and proper treatment, ADHD may have serious consequences including school dropout, depression, problems with relationships, substance abuse, delinquency, and job failure. Early identification and treatment are extremely important. Scientists continue to study the exact relationship of ADHD to environmental factors, but there is no single known cause and many factors may play a part. In studying the data available on children and parental health, family functioning, community characteristics, health insurance coverage, and more, we hope to learn about the individuals known to be affected by this disorder. We seek to help remove some of the mystery for those currently diagnosed, and to improve diagnosis in the future.