Parkinson’s Predictions

# **Christine Hathaway Spring 2020** <https://github.com/chhathaway71/DSC-680>

# Which Domain?

1. Barmore, R. (n.d.). *Stages of Parkinson's*. Retrieved from Parkinson's Foundation: https://www.parkinson.org/Understanding-Parkinsons/What-is-Parkinsons/Stages-of-Parkinsons.
2. Downward, E., & Johns Pool, J. (2019, September). *How Common Is Parkinson’s Disease?* Retrieved from Parkinsons Disease.net: https://parkinsonsdisease.net/basics/statistics/. Discusses who is affected by Parkinson's, as well as the projected estimates of the disease within the aging population.
3. Holtzman, J. (2013, March 24). *The Parkinson’s Voice Initiative: Early Diagnosis for Parkinson’s Disease through Speech Recognition*. Retrieved from Stanford.edu: https://web.stanford.edu/group/sjph/cgi-bin/sjphsite/the-parkinsons-voice-initiative-early-diagnosis-for-parkinsons-disease-through-speech-recognition/. Describes a project that is researching how to diagnosis the disease through speech recognition.
4. Johns Hopkins Medicine. (n.d.). *How Parkinson's Disease Is Diagnosed*. Retrieved from Johns Hopkins Medicine: https://www.hopkinsmedicine.org/health/treatment-tests-and-therapies/how-parkinson-disease-is-diagnosed. Discusses diagnostic standards and what doctors look for when diagnozing Parkinson's. Also explains testing mechanisms and whether an early diagnosis is possible.
5. Knabe, K. (2018, July 16). *Rising Tide: New Study Finds Prevalence of Parkinson's Increasing*. Retrieved from Michael J Fox.org: https://www.michaeljfox.org/news/rising-tide-new-study-finds-prevalence-parkinsons-increasing. Describes a study that concluded that Parkinson's disease is on the rise.
6. Mayo Clinic. (n.d.). *Parkinson's disease*. Retrieved from Mayo Clinic: https://www.mayoclinic.org/diseases-conditions/parkinsons-disease/symptoms-causes/syc-20376055. More discussion defining what the disease is, what the symptoms look like,causes, risk factors, complications, and possible prevention.
7. Medical News Today. (n.d.). *Parkinson's Stages: Signs and symptoms*. Retrieved from Medical News Today: https://www.medicalnewstoday.com/articles/320476. Explains the 5 stages of Parkinson's as well as the signs and symptoms to look for. It also introduces the rating scales that doctor's use to determine the progression of the disease.
8. National Institute on Aging. (2017, May 16). *Parkinson's Disease*. Retrieved from National Institute on Aging: https://www.nia.nih.gov/health/parkinsons-disease. Discusses the disease, it's causes, symptoms, diagnosis, treatment, and the risk factor of age.
9. Parkinson's Foundation. (n.d.). *Parkinson's Foundation*. Retrieved from Parkinson.org: https://www.parkinson.org/Understanding-Parkinsons/Statistics. Facts and statistics regarding the disease from the Parkinson's Foundation.
10. Parkinson's Data Set. (2008, June 26). *Oxford Parkinson's Disease Detection Dataset*. Retrieved from UCI Machine Learning Repository: http://archive.ics.uci.edu/ml/datasets/parkinsons. Contains the data set and description of the data.
11. Silva, C. (2018, February 5). *Speech Analysis May Help Diagnose Parkinson’s and at Earlier Stage, Study Says*. Retrieved from Parkinson's News Today: https://parkinsonsnewstoday.com/2018/02/05/speech-analysis-can-help-detect-parkinsons-in-early-stages-study-says/. Describes techniques that analyze speech and vocal patterns that could be used as effective tools to diagnose the disease.
12. Spears, C. (n.d.). *10 Early Signs of Parkinson's Disease*. Retrieved from Parkinson's Foundation: https://www.parkinson.org/understanding-parkinsons/10-early-warning-signs. The Parkinson's Foundation describes 10 warning signs that can be early indicators of the disease.

# Which Data?

The dataset I am using for this project was created by Max Little of the University of Oxford, in collaboration with the National Centre for Voice and Speech, Denver, Colorado, who recorded the speech signals. The original study published the feature extraction methods for general voice disorders (Parkinsons Data Set, 2008). The dataset and information can be found at this link <http://archive.ics.uci.edu/ml/datasets/parkinsons>.

# Research Questions? Benefits? Why analyze these data?

Parkinson’s disease can be troubling because there is no known cure at this time. While there are management techniques, the disease is progressive. I have two family members that have suffered from some of the symptoms of Parkinson’s, but fortunately do not have the actual disease. The hand tremors can be debilitating in that they have taken away my father’s livelihood as a welder who needs steady hands to perform his craft. Because of this, I believe that getting an early diagnosis could delay the onset of symptoms, thus leading to a better quality of life.

# What Method?

I plan to use Python extensively for this project, to perform exploratory data analysis as well as cleaning the data. For this particular project, I would like to use a new method in Python that I do not usually use called XGBClassifier, available in the xgboost Python library. I want to use a new technique in order to expand my skill sest.

# Potential Issues?

One of the first challenges will be using a new technique, and there are a number of things that could go wrong in attempting something new I plan to research the method thoroughly and utilize different sources to understand how to use it. Another problem could be that dataset, as it is somewhat small. The final challenge is that there may not be a way to detect the disease using the methods that this study utilized.

# Concluding Remarks

Parkinson’s disease is a progressive nervous system disorder that affects movement (Mayo Clinic, n.d.). Symptoms often start gradually, sometimes with a slight tremor in the hand. The disorder can also cause stiffness or slowing of movement. Symptoms can also include rigid muscles, impaired posture and balance, loss of automatic movements, speech changes, and writing changes (Mayo Clinic, n.d.). Typically, there are five stages to Parkinson’s. The stages correspond both to the severity of movement symptoms and so how much the disease affects a person’s daily activity. Doctors also use scales that help them understand the progression of the disease, which focus on motor symptoms (Parkinson's Foundation, n.d.).

Making an accurate diagnosis of Parkinson’s disease can be complicated. Factors that doctors must carefully consider include not just symptoms but family history as well. The standard diagnosis is clinical, meaning there is not test that can give a conclusive result. Instead, doctors look for certain physical symptoms to be present to qualify a person’s condition as Parkinson’s disease (Johns Hopkins Medicine, n.d.). A study conducted by three research centers are looking at techniques that analyze speech and vocal patterns that might be effective tools to diagnose Parkinson’s disease, and possibly at earlier stages than is now possible (Holtzman, 2013). Their results build on past work that demonstrates that speech carries information relevant to an accurate and differential diagnosis of Parkinson’s, and also shows that speech features of interest can be automated and assessed, with diagnostic reliability (Holtzman, 2013). Early detection, along with the start of treatment, would have a relevant effect on both the quality of life of patients and the healthcare system. This would allow the development of new therapies, and a better understanding of the disease and its evolution, according to Juan Ignacio Godino, a researcher in the study (Holtzman, 2013).

# References

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Johns Hopkins Medicine. (n.d.). *How Parkinson's Disease Is Diagnosed*. Retrieved from Johns Hopkins Medicine: https://www.hopkinsmedicine.org/health/treatment-tests-and-therapies/how-parkinson-disease-is-diagnosed

Mayo Clinic. (n.d.). *Parkinson's disease*. Retrieved from Mayo Clinic: https://www.mayoclinic.org/diseases-conditions/parkinsons-disease/symptoms-causes/syc-20376055

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