

Jack Taylor  
CA05  
Intro to Machine Learning  
Professor Brahma  
03/26/2021

Github repository link: <https://github.com/jack-msba2021/CA05>

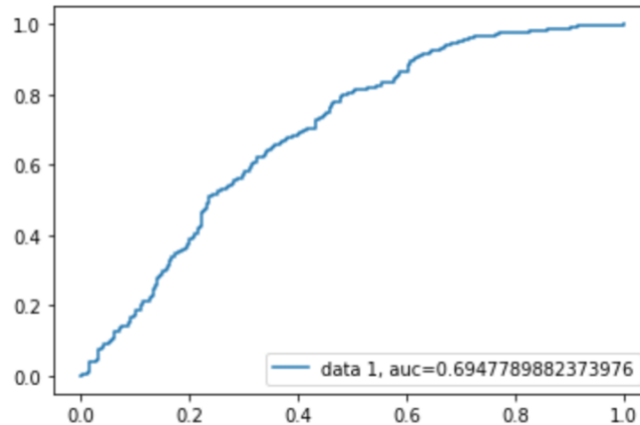
## Part 2: Feature Importance (sorted in order of decreasing influence)

- Waist: 1.136628
- Hip: -0.609560
- Race: -0.372387
- Hlthlm25: -0.363242
- Av\_weight\_kg: -0.235567
- Neck: -0.185504
- Educat: 0.183015
- Parrptdiab: .159858
- Mstat: -0.137113
- Tired: 0.117776
- Bend25: 0.088405
- Happy25: -0.083514
- Srhype: 0.072874
- Tea15: -0.066710
- age\_s1: 0.007290
- cgpkyl: 0.000386

According to this model, some of the features with the most influence on predicting CVD risk is waist, hip, race, hlthlm25, av\_weight\_kg, and neck.

## Part 3: Performance Evaluation

Accuracy: 0.69  
Precision: 0.70  
Recall: 0.83  
ROC Curve: 0.70



This model was tested using both liblinear, newton-cg, and lbfgs algorithms, and returned the highest recall and ROC value when using newton-cg.

According to the evaluation metrics, this model does a good job at predicting true positives, but its ROC value is relatively low, as it is closer to being random prediction than a perfect prediction.

#### **Data Column (Feature Name) Descriptions:**

- cvd\_4types: Label Column
  - 0 indicates “No Risk”
  - 1 indicates “Risk Present”
- age\_s1: Age in Years
- race: race
  - 1: White
  - 2: Black
  - 3: Other
- educat: Education Level
  - 1: Less than 10 years of education
  - 2: 11-15 years of education
  - 3: 16-20 years of education
  - 4: More than 20 years of education
- mstat: Marital Status
  - 1: Married
  - 2: Widowed
  - 3: Divorced/separated
  - 4: Never married
  - 8: Unknown/refused
- hip: Hip Circumference (measured in centimeters)
- neck20: Neck Circumference (measured in centimeters)
- waist: Waist Circumference (measured in centimeters)
- av\_weight\_kg: Average Weight (measured in kilograms)

- cgpkyl: Cigarette pack-years
  - Lifetime cigarette smoking: pack years
- tea15: cups of tea on a regular day
  - How many cups of tea (with caffeine) do you drink on a regular day?
- srhype: Self-reported hypertension
  - 0: No
  - 1: Yes
- parrptdiab: History of Diabetes
  - Parent cohort diabetes status
    - 0: No
    - 1: Yes
- bend25: Health limits bending, kneeling, or stooping
  - Does your health now limit you in this activity, and if so, how much
    - 1: Yes, limited a lot
    - 2: Yes, limited a little
    - 3: No, not limited at all
- happy25: Benn a happy person
  - During the past 4 weeks, how much the time have you been a happy person?
    - 1: All of the time
    - 2: Most of the time
    - 3: A good bit of the time
    - 4: Some of the time
    - 5: A little of time
    - 6: None of the time
- tired25: Felt tired
  - During the past 4 weeks, how much of the time did you feel tired?
    - 1: All of the time
    - 2: Most of the time
    - 3: A good bit of the time
    - 4: Some of the time
    - 5: A little of time
    - 6: None of the time
- hlthlm25: Health limited your social activities
  - During the past 4 weeks, how much of the time has your health limited your social activities (like visiting with friends or close relatives)?
    - 1: All of the time
    - 2: Most of the time
    - 3: Some of the time
    - 4: A little of the time
    - 5: None of the time