**Consolidated Results for algorithmic bias for race**

1. **Analysis of overall Data**
2. **With SSL\_SCORE and RACE\_CODE\_CD**
3. Without PSM (SSL\_SCORE and RACE\_CODE\_CD)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **T-test values on overall data for Black and White without PSM** | | | | |
| **Average SSL\_SCORE value of Black** | **Average SSL\_SCORE value of White** | **Difference between Average SSL\_SCORE values of Black and White** | **T-Score** | **P-Value** |
| 282.4735 | 269.8436 | 12.62 | 52.933 | 2.2e-16 |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **T-test values on overall data for Black and White with PSM** | | | | |
| **Average SSL\_SCORE value of Black** | **Average SSL\_SCORE value of White** | **Difference between Average SSL\_SCORE** **values of Black and White** | **T-Score** | **P-Value** |
| 270.6406 | 269.8436 | 0.797 | 2.8344 | 0.004592 |

1. With PSM (SSL\_SCORE and RACE\_CODE\_CD)
2. **With SSL\_SCORE\_RANK and RACE\_CODE\_CD**
3. Without PSM (SSL\_SCORE\_RANK and RACE\_CODE\_CD)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **T-test values on overall data for Black and White without PSM** | | | | |
| **Average SSL\_SCORE\_RANK value of Black** | **Average SSL\_SCORE\_RANK value of White** | **Difference between Average SSL\_SCORE\_RANK values of Black and White** | **T-Score** | **P-Value** |
| 191951.8 | 216843.3 | 24891.5 | -53.416 | < 2.2e-16 |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **T-test values on overall data for Black and White with PSM** | | | | |
| **Average SSL\_SCORE\_RANK value of Black** | **Average SSL\_SCORE\_RANK value of White** | **Difference between Average SSL\_SCORE\_RANK values of Black and White** | **T-Score** | **P-Value** |
| 215031.2 | 216843.3 | 1812.1 | -3.3087 | 0.0009376 |

1. With PSM (SSL\_SCORE\_RANK and RACE\_CODE\_CD)
2. **Analysis of records with age brackets for entire data**
3. **With SSL\_SCORE and RACE\_CODE\_CD**
4. Without PSM (SSL\_SCORE and RACE\_CODE\_CD)

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **T-test values according to age brackets for Black and White without PSM** | | | | | |
| **Age Brackets** | **Average SSL\_SCORE** **value of Black** | **Average SSL\_SCORE** **value of White** | **Difference between Average SSL\_SCORE** **values of Black and White** | **T-Score** | **P-Value** |
| < 20 | 352.4398 | 338.7294 | 13.7104 | 74.384 | < 2.2e-16 |
| 20-30 | 315.8281 | 308.0776 | 7.7505 | 62.736 | < 2.2e-16 |
| 30-40 | 270.0234 | 266.9068 | 3.1166 | 22.336 | < 2.2e-16 |
| 40-50 | 224.1352 | 221.2455 | 2.8897 | 17.368 | < 2.2e-16 |
| 50-60 | 182.2626 | 179.4239 | 2.8387 | 13.994 | < 2.2e-16 |
| 60-70 | 140.2136 | 136.5762 | 3.63 | 8.993 | < 2.2e-16 |
| 70-80 | 92.76299 | 90.06897 | 2.69 | 2.6001 | 0.009492 |

1. With PSM (SSL\_SCORE and RACE\_CODE\_CD)

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **T-test values according to age brackets for Black and White with PSM** | | | | | |
| **Age Brackets** | **Average SSL\_SCORE** value **of Black** | **Average SSL\_SCORE** **value of White** | **Difference between Average SSL\_SCORE** **values of Black and White** | **T-Score** | **P-Value** |
| < 20 | 343.0558 | 338.7294 | 4.3264 | 22.318 | < 2.2e-16 |
| 20-30 | 308.9267 | 308.0776 | 0.8491 | 6.7633 | 1.362e-11 |
| 30-40 | 266.8702 | 266.9068 | 0.0366 | -0.23855 | 0.8115 |
| 40-50 | 221.4124 | 221.2455 | 0.1669 | 0.90227 | 0.3669 |
| 50-60 | 178.9124 | 179.4239 | 0.5115 | -2.2496 | 0.02448 |
| 60-70 | 136.9253 | 136.5762 | 0.3491 | 0.80774 | 0.4193 |
| 70-80 | 90.79310 | 90.06897 | 0.72413 | 0.65991 | 0.5095 |

1. **With SSL\_SCORE\_RANK and RACE\_CODE\_CD**
2. Without PSM (SSL\_SCORE\_RANK and RACE\_CODE\_CD)

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **T-test values according to age brackets for Black and White without PSM** | | | | | |
| **Age Brackets** | **Average SSL\_SCORE\_RANK value of Black** | **Average SSL\_SCORE\_RANK value of White** | **Difference between Average SSL\_SCORE\_RANK values of Black and White** | **T-Score** | **P-Value** |
| < 20 | 38808.39 | 53905.35 | 15096.96 | -57.827 | < 2.2e-16 |
| 20-30 | 124153.2 | 142788.4 | 18635.2 | -56.499 | < 2.2e-16 |
| 30-40 | 242721.1 | 250290.1 | 7569 | -24.429 | < 2.2e-16 |
| 40-50 | 322401.5 | 326862.5 | 4461 | -18.641 | < 2.2e-16 |
| 50-60 | 369161.6 | 372050.0 | 2888.4 | -15.432 | < 2.2e-16 |
| 60-70 | 391908.0 | 393293.1 | 1385.1 | -10.035 | < 2.2e-16 |
| 70-80 | 397891.4 | 398041.5 | 150.1 | -3.3704 | 0.0007888 |

1. With PSM (SSL\_SCORE\_RANK and RACE\_CODE\_CD)

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **T-test values according to age brackets for Black and White with PSM** | | | | | |
| **Age Brackets** | **Average SSL\_SCORE\_RANK value of Black** | **Average SSL\_SCORE\_RANK value of White** | **Difference between Average SSL\_SCORE\_RANK values of Black and White** | **T-Score** | **P-Value** |
| < 20 | 46712.96 | 53905.35 | 7192.39 | -22.307 | < 2.2e-16 |
| 20-30 | 140260.7 | 142788.4 | 2527.7 | -6.8971 | 5.361e-12 |
| 30-40 | 250354.0 | 250290.1 | 63.9 | 0.19252 | 0.8473 |
| 40-50 | 326716.2 | 326862.5 | 146.3 | -0.5754 | 0.565 |
| 50-60 | 372484.3 | 372050.0 | 434.3 | 2.2172 | 0.02662 |
| 60-70 | 393275.1 | 393293.1 | 18 | -0.16204 | 0.8713 |
| 70-80 | 397982.5 | 398041.5 | 59 | -1.2818 | 0.2004 |

1. **Analysis of first 1000 records without age brackets**
2. **SSL\_SCORE and RACE\_CODE\_CD**
3. Without PSM (SSL\_SCORE and RACE\_CODE\_CD)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **T-test values for first 1000 data for Black and White without PSM** | | | | |
| **Average SSL\_SCORE value of Black** | **Average SSL\_SCORE** **value of White** | **Difference between Average SSL\_SCORE** **values of Black and White** | **T-Score** | **P-Value** |
| 463.5643 | 474.7692 | 11.2049 | -1.529 | 0.1518 |

1. With PSM (SSL\_SCORE and RACE\_CODE\_CD)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **T-test values on overall data for Black and White with PSM** | | | | |
| **Average SSL\_SCORE** **value of Black** | **Average SSL\_SCORE** **value of White** | **Difference between Average SSL\_SCORE** **values of Black and White** | **T-Score** | **P-Value** |
| 464.8462 | 474.7692 | 9.923 | -1.0881 | 0.2882 |

**B) SSL\_SCORE\_RANK and RACE\_CODE\_CD**

1. Without PSM (SSL\_SCORE\_RANK and RACE\_CODE\_CD)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **T-test values for first 1000 data for Black and White without PSM** | | | | |
| **Average SSL\_SCORE\_RANK value of Black** | **Average SSL\_SCORE\_RANK value of White** | **Difference between Average SSL\_SCORE\_RANK values of Black and White** | **T-Score** | **P-Value** |
| 532.7254 | 374.2308 | 158.4946 | 1.5357 | 0.15 |

1. With PSM (SSL\_SCORE\_RANK and RACE\_CODE\_CD)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **T-test values on overall data for Black and White with PSM** | | | | |
| **Average SSL\_SCORE\_RANK value of Black** | **Average SSL\_SCORE\_RANK value of White** | **Difference between Average SSL\_SCORE\_RANK values of Black and White** | **T-Score** | **P-Value** |
| 505.5385 | 374.2308 | 131.3077 | 1.0062 | 0.3249 |

1. **Analysis of first 1000 records with age brackets**
2. **SSL\_SCORE and RACE\_CODE\_CD**
3. Without PSM (SSL\_SCORE and RACE\_CODE\_CD)

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **T-test values according to age brackets for Black and White without PSM** | | | | | |
| **Age Brackets** | **Average SSL\_SCORE** **value of Black** | **Average SSL\_SCORE** **value of White** | **Difference between Average SSL\_SCORE** **values of Black and White** | **T-Score** | **P-Value** |
| < 20 | 463.8998 | 474.8889 | 10.9891 | -1.2379 | 0.2504 |
| 20-30 | 462.3023 | 474.5000 | 12.1977 | -0.81288 | 0.4746 |

\*30-40: Only 6 records are present in this age group and their gender is Male and no female records are present

\*40-80: No records of this age group present in first 1000.

1. With PSM (SSL\_SCORE and RACE\_CODE\_CD)

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **T-test values according to age brackets for Black and White with PSM** | | | | | | | |
| **Age Brackets** | **Average SSL\_SCORE** **value of Black** | **Average SSL\_SCORE** **value of White** | **Difference between Average SSL\_SCORE** **values of Black and White** | **T-Score** | | **P-Value** | |
| < 20 | 468.4444 | 474.8889 | 6.4445 | | -0.56822 | | 0.5781 |
| 20-30 | 467.75 | 474.50 | 6.75 | | -0.36635 | | 0.7279 |

\*30-40: Only 7 records are present in this age group and their RACE is black and no records with race white are present

\*40-80: No records of this age group present in first 1000.

1. **SSL\_SCORE\_RANK and RACE\_CODE\_CD**
2. Without PSM (SSL\_SCORE\_RANK and RACE\_CODE\_CD)

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **T-test values according to age brackets for Black and White without PSM** | | | | | |
| **Age Brackets** | **Average SSL\_SCORE\_RANK value of Black** | **Average SSL\_SCORE\_RANK value of White** | **Difference between Average SSL\_SCORE\_RANK values of Black and White** | **T-Score** | **P-Value** |
| < 20 | 529.7240 | 377.1111 | 152.6129 | 1.2449 | 0.2478 |
| 20-30 | 543.0698 | 367.7500 | 175.3198 | 0.79808 | 0.4819 |

\*30-40: Only 7 records are present in this age group and their RACE is black and no records with race white are present

\*40-80: No records of this age group present in first 1000.

1. With PSM (SSL\_SCORE\_RANK and RACE\_CODE\_CD)

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **T-test values according to age brackets for Black and White with PSM** | | | | | |
| **Age Brackets** | **Average SSL\_SCORE\_RANK value of Black** | **Average SSL\_SCORE\_RANK value of White** | **Difference between Average SSL\_SCORE\_RANK values of Black and White** | **T-Score** | **P-Value** |
| < 20 | 461.3333 | 377.1111 | 84.22 | 0.506 | 0.6198 |
| 20-30 | 424.00 | 367.75 | 56.25 | 0.21582 | 0.8374 |

\*30-40: Only 7 records are present in this age group and their RACE is black and no records with race white are present

\*40-80: No records of this age group present in first 1000.

**Code and data links:**

|  |  |  |
| --- | --- | --- |
|  | **Code Git Hub Link** | **Dataset Git Hub Link** |
| **Section 1: Analysis of overall Data** |  |  |
| **Analysis of overall Data with & without PSM** | https://github.com/kshitijkhurana3010/Algorithmic-Bias-Project/blob/master/0712%20OVERALL%20SSL\_SCORE%20SSL\_SCORE\_RANK%20and%20RACE\_CODE\_CD.ipynb | https://github.com/kshitijkhurana3010/Algorithmic-Bias-Project/blob/master/SSL\_RAT\_RACE\_Code\_Full.csv |
| **Section 2: Analysis of Overall Data by Age with and without PSM** |  |  |
| <20 | https://github.com/kshitijkhurana3010/Algorithmic-Bias-Project/blob/master/0712%20AGE%20SSL\_SCORE%20SSL\_SCORE\_RANK%20and%20RACE\_CODE\_CD%20LESS%20THAN%2020%20.ipynb | https://github.com/kshitijkhurana3010/Algorithmic-Bias-Project/blob/master/SSL\_RAT\_RACE\_CODE\_LESS\_THAN\_20.csv |
| 20-30 | https://github.com/kshitijkhurana3010/Algorithmic-Bias-Project/blob/master/0712%20AGE%20SSL\_SCORE%20SSL\_SCORE\_RANK%20and%20RACE\_CODE\_CD%2020-30.ipynb | https://github.com/kshitijkhurana3010/Algorithmic-Bias-Project/blob/master/SSL\_RAT\_RACE\_CODE\_20\_30.csv |
| 30-40 | https://github.com/kshitijkhurana3010/Algorithmic-Bias-Project/blob/master/0712%20AGE%20SSL\_SCORE%20SSL\_SCORE\_RANK%20and%20RACE\_CODE\_CD%2030-40.ipynb | https://github.com/kshitijkhurana3010/Algorithmic-Bias-Project/blob/master/SSL\_RAT\_RACE\_CODE\_30\_40.csv |
| 40-50 | https://github.com/kshitijkhurana3010/Algorithmic-Bias-Project/blob/master/0712%20AGE%20SSL\_SCORE%20SSL\_SCORE\_RANK%20and%20RACE\_CODE\_CD%2040-50.ipynb | https://github.com/kshitijkhurana3010/Algorithmic-Bias-Project/blob/master/SSL\_RAT\_RACE\_CODE\_40\_50.csv |
| 50-60 | https://github.com/kshitijkhurana3010/Algorithmic-Bias-Project/blob/master/0712%20AGE%20SSL\_SCORE%20SSL\_SCORE\_RANK%20and%20RACE\_CODE\_CD%2050-60.ipynb | https://github.com/kshitijkhurana3010/Algorithmic-Bias-Project/blob/master/SSL\_RAT\_RACE\_CODE\_50\_60.csv |
| 60-70 | https://github.com/kshitijkhurana3010/Algorithmic-Bias-Project/blob/master/0712%20AGE%20SSL\_SCORE%20SSL\_SCORE\_RANK%20and%20RACE\_CODE\_CD%2060-70.ipynb | https://github.com/kshitijkhurana3010/Algorithmic-Bias-Project/blob/master/SSL\_RAT\_RACE\_CODE\_60\_70.csv |
| 70-80 | https://github.com/kshitijkhurana3010/Algorithmic-Bias-Project/blob/master/0712%20AGE%20SSL\_SCORE%20SSL\_SCORE\_RANK%20and%20RACE\_CODE\_CD%2070-80.ipynb | https://github.com/kshitijkhurana3010/Algorithmic-Bias-Project/blob/master/SSL\_RAT\_RACE\_CODE\_70\_80.csv |
| **Section 3: Analysis of first 1000 Records** |  |  |
| **Analysis of first 1000 Records with and without PSM** | https://github.com/kshitijkhurana3010/Algorithmic-Bias-Project/blob/master/0712%20FIRST%201000%20%20SSL\_SCORE%20SSL\_SCORE\_RANK%20and%20RACE\_CODE\_CD.ipynb | https://github.com/kshitijkhurana3010/Algorithmic-Bias-Project/blob/master/SSL\_FIRST\_1000\_RACE\_Code.csv |
| **Section 4: Analysis of first 1000 Records by age with and without PSM** |  |  |
| <20 | https://github.com/kshitijkhurana3010/Algorithmic-Bias-Project/blob/master/0712%20FIRST%201000%20%20SSL\_SCORE%20SSL\_SCORE\_RANK%20and%20RACE\_CODE\_CD\_LESS\_THAN\_20.ipynb | https://github.com/kshitijkhurana3010/Algorithmic-Bias-Project/blob/master/SSL\_FIRST\_1000\_RACE\_CODE\_LESS\_THAN\_20.csv |
| 20-30 | https://github.com/kshitijkhurana3010/Algorithmic-Bias-Project/blob/master/0712%20FIRST%201000%20%20SSL\_SCORE%20SSL\_SCORE\_RANK%20and%20RACE\_CODE\_CD\_20-30.ipynb | https://github.com/kshitijkhurana3010/Algorithmic-Bias-Project/blob/master/SSL\_FIRST\_1000\_RACE\_CODE\_20\_30.csv |
| 30-40 | NA | https://github.com/kshitijkhurana3010/Algorithmic-Bias-Project/blob/master/SSL\_FIRST\_1000\_RACE\_CODE\_30\_40.csv |