INCA Report

* Original Data had 22 variables
* This was then reduced to give three different subsets of the original data.
  + InputBase
    - Contains every variable but ones that would be inappropriate to include
  + Input
    - One with vars removed by me using plotmatrix
    - Show plot matrix
    - Why I chose those vars
    - Which ones I removed
    - % Plot matrices of Jitter attributes
    - % Plot matrices of shimmer attributes
    - % Plot matrices of rest
    - % From this can see Jitter:RAP and Jitter:DDP correlated
    - % From this can see Shimmer:APQ3 and Shimmer:DDA correlated
    - % So can remove Jitter:RAP and Shimmer:ADPQ3 vars
  + InputPCA
    - Same as input with further variables removed by PCA
    - How I performed PCA
    - Add in graph
    - What variables I ended up removing and why
    - % PCA - Remove more vars
    - % From this can see last 8 vars have an eigenvalue < 0.000
  + Why I did this:
    - Wanted to see the effect of removing variables
    - See if performance increased or decresased
  + What happened
* Validating the data
  + Need to check data was in the right format
* When using this data with each neural network I will split it (by hand) into the three sets; training, test and validate.
  + Training
    - Training will have the data from index 1:2928.
    - This is the first 21 patients.
  + Validation
    - Training will have the data from index 2929:4531.
    - This is the next 11 patients.
  + Test
    - Test will have the data from index 4531:5875
    - This is the last 10 patients
  + Why did I do this
    - Can’t let mat lab split the data itself.
    - May end up with the same patient in train/test/validate.
    - Wouldn’t be predicting the score then but learning what individual patients data looked like

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Data Used | Hidden Layer Sizes | Run Number | MSE | Epoch | Training-Regression | Validation-Regression | Test-Regression |
| inputBase | 5 | 1 | 73.399 | 4 | 0.515 | 0.641 | 0.068 |
|  |  | 2 | 87.136 | 2 | 0.247 | 0.586 | -0.155 |
|  |  | 3 | 83.775 | 2 | 0.371 | 0.658 | -0.049 |
|  |  | avg | 81.436 | 2.666 | 0.377 | 0.628 | -0.045 |
|  | 10 | 1 | 102.05 | 6 | 0.581 | 0.504 | -0.049 |
|  |  | 2 | 86.559 | 2 | 0.506 | 0.668 | 0 |
|  |  | 3 | 83.013 | 1 | 0.345 | 0.648 | -0.022 |
|  |  | avg | 90.540 | 3 | 0.477 | 0.606 | -0.023 |
|  | 15 | 1 | 83.573 | 4 | 0.59 | 0.561 | -0.182 |
|  |  | 2 | 105.751 | 9 | 0.571 | 0.522 | 0.035 |
|  |  | 3 | 131.706 | 7 | 0.663 | 0.414 | -0.287 |
|  |  | avg | 107.01 | 6.666 | 0.608 | 0.499 | -0.144 |
|  | 20 | 1 | 91.852 | 9 | 0.664 | 0.584 | 0.143 |
|  |  | 2 | 94.224 | 5 | 0.649 | 0.616 | 0.277 |
|  |  | 3 | 276.483 | 19 | 0.787 | 0.371 | 0.394 |
|  |  | avg | 154.186 | 11 | 0.7 | 0.523 | 0.271 |
|  | 25 | 1 | 106.837 | 10 | 0.612 | 0.467 | 0.28 |
|  |  | 2 | 88.806 | 2 | 0.52 | 0.511 | -0.134 |
|  |  | 3 | 75.419 | 3 | 0.555 | 0.624 | 0.015 |
|  |  | avg | 90.354 | 5 | 0.562 | 0.534 | 0.053 |
|  | [5 10] | 1 | 84.6885 | 6 | 0.58111 | 0.52818 | -0.05488 |
|  |  | 2 | 86.2059 | 5 | 0.52961 | 0.51788 | 0.13035 |
|  |  | 3 | 73.8853 | 14 | 0.68231 | 0.61883 | 0.32159 |
|  |  | avg | 81.59323 | 8.333333 | 0.597677 | 0.554963 | 0.132354 |
|  | [10 15] | 1 | 109.5384 | 5 | 0.25378 | 0.42943 | -0.29451 |
|  |  | 2 | 89.7534 | 5 | 0.64279 | 0.50439 | 0.29139 |
|  |  | 3 | 92.1505 | 6 | 0.48033 | 0.64459 | 0.049237 |
|  |  | avg | 97.14743 | 5.333333 | 0.458967 | 0.526137 | 0.015372 |
|  | [15 20] | 1 | 67.5572 | 5 | 0.57571 | 0.66529 | 0.093508 |
|  |  | 2 | 99.0554 | 6 | 0.62757 | 0.52227 | 0.16041 |
|  |  | 3 | 115.349 | 3 | 0.68354 | 0.44822 | -0.01492 |
|  |  | avg | 93.9872 | 4.666667 | 0.62894 | 0.54526 | 0.079668 |
| input | 5 | 1 | 93.527 | 2 | 0.501 | 0.471 | -0.008 |
|  |  | 2 | 80.291 | 4 | 0.258 | 0.568 | 0.079 |
|  |  | 3 | 89.341 | 9 | 0.591 | 0.522 | -0.015 |
|  |  | avg | 87.719 | 5 | 0.45 | 0.520 | 0.018 |
|  | 10 | 1 | 88.88 | 2 | 0.43 | 0.677 | -0.025 |
|  |  | 2 | 83.447 | 6 | 0.641 | 0.642 | 0.089 |
|  |  | 3 | 64.216 | 14 | 0.732 | 0.692 | 0.288 |
|  |  | avg | 78.847 | 7.333 | 0.601 | 0.670 | 0.117 |
|  | 15 | 1 | 90.162 | 2 | 0.464 | 0.51 | -0.054 |
|  |  | 2 | 103.768 | 3 | 0.645 | 0.497 | 0.335 |
|  |  | 3 | 105.936 | 6 | 0.63 | 0.492 | 0.477 |
|  |  | avg | 99.955 | 3.666 | 0.579 | 0.499 | 0.252 |
|  | 20 | 1 | 167.621 | 5 | 0.681 | 0.544 | 0.405 |
|  |  | 2 | 93.29 | 3 | 0.549 | 0.534 | -0.102 |
|  |  | 3 | 70.186 | 5 | 0.647 | 0.664 | 0.427 |
|  |  | avg | 110.365 | 4.333 | 0.625 | 0.580 | 0.243 |
|  | 25 | 1 | 225.96 | 2 | 0.305 | 0.285 | 0.102 |
|  |  | 2 | 80.648 | 3 | 0.55 | 0.575 | -0.143 |
|  |  | 3 | 79.782 | 5 | 0.611 | 0.656 | 0.06 |
|  |  | avg | 128.796 | 3.333 | 0.488 | 0.505 | 0.006 |
|  | [5 10] | 1 | 84.4102 | 7 | 0.60836 | 0.53356 | 0.033058 |
|  |  | 2 | 85.0714 | 8 | 0.62562 | 0.61156 | -0.13098 |
|  |  | 3 | 103.7182 | 14 | 0.68778 | 0.42195 | 0.037049 |
|  |  | avg | 91.0666 | 9.666667 | 0.640587 | 0.522357 | -0.02029 |
|  | [10 15] | 1 | 83.3737 | 5 | 0.55756 | 0.54846 | -0.12181 |
|  |  | 2 | 84.233 | 2 | 0.49877 | 0.53332 | 0.099705 |
|  |  | 3 | 83.3604 | 24 | 0.88314 | 0.61428 | 0.29772 |
|  |  | avg | 83.6557 | 10.33333 | 0.64649 | 0.565353 | 0.091872 |
|  | [15 20] | 1 | 93.7898 | 3 | 0.50508 | 0.59719 | 0.037259 |
|  |  | 2 | 77.0311 | 5 | 0.6251 | 0.64361 | -0.15327 |
|  |  | 3 | 164.824 | 6 | 0.52311 | 0.38988 | 0.35964 |
|  |  | avg | 111.8816 | 4.666667 | 0.551097 | 0.54356 | 0.08121 |
| inputPCA | 5 | 1 | 73.399 | 4 | 0.515 | 0.641 | 0.068 |
|  |  | 2 | 87.136 | 2 | 0.247 | 0.586 | -0.155 |
|  |  | 3 | 83.775 | 2 | 0.371 | 0.658 | -0.049 |
|  |  | avg | 81.436 | 2.666 | 0.377 | 0.628 | -0.045 |
|  | 10 | 1 | 102.05 | 6 | 0.581 | 0.504 | -0.049 |
|  |  | 2 | 86.559 | 2 | 0.506 | 0.668 | 0 |
|  |  | 3 | 83.013 | 1 | 0.345 | 0.648 | -0.022 |
|  |  | avg | 90.540 | 3 | 0.477 | 0.606 | -0.023 |
|  | 15 | 1 | 83.573 | 4 | 0.59 | 0.561 | -0.182 |
|  |  | 2 | 105.751 | 9 | 0.571 | 0.522 | 0.035 |
|  |  | 3 | 131.706 | 7 | 0.663 | 0.414 | -0.287 |
|  |  | avg | 107.01 | 6.666 | 0.608 | 0.499 | -0.144 |
|  | 20 | 1 | 91.852 | 9 | 0.664 | 0.584 | 0.143 |
|  |  | 2 | 94.224 | 5 | 0.649 | 0.616 | 0.277 |
|  |  | 3 | 276.483 | 19 | 0.787 | 0.371 | 0.394 |
|  |  | avg | 154.186 | 11 | 0.7 | 0.523 | 0.271 |
|  | 25 | 1 | 106.837 | 10 | 0.612 | 0.467 | 0.28 |
|  |  | 2 | 88.806 | 2 | 0.52 | 0.511 | -0.134 |
|  |  | 3 | 75.419 | 3 | 0.555 | 0.624 | 0.015 |
|  |  | avg | 90.354 | 5 | 0.562 | 0.534 | 0.053 |
|  | [5 10] | 1 | 104.3108 | 9 | 0.49549 | 0.38559 | 0.20321 |
|  |  | 2 | 81.1868 | 6 | 0.5621 | 0.58907 | 0.035408 |
|  |  | 3 | 85.3372 | 9 | 0.53667 | 0.66804 | 0.30623 |
|  |  | avg | 90.27827 | 8 | 0.53142 | 0.547567 | 0.181616 |
|  | [10 15] | 1 | 67.8701 | 3 | 0.48418 | 0.66446 | 0.62886 |
|  |  | 2 | 68.4243 | 10 | 0.47345 | 0.7667 | 0.072563 |
|  |  | 3 | 61.3499 | 13 | 0.60628 | 0.69704 | -0.0743 |
|  |  | avg | 65.88143 | 8.666667 | 0.521303 | 0.7094 | 0.209041 |
|  | [15 20] | 1 | 72.9452 | 1 | 0.27871 | 0.61423 | 0.15095 |
|  |  | 2 | 69.0221 | 6 | 0.49218 | 0.6562 | 0.29737 |
|  |  | 3 | 444.1754 | 17 | 0.82643 | 0.36313 | -0.31027 |
|  |  | avg | 195.3809 | 8 | 0.53244 | 0.54452 | 0.046017 |

MLP

* Can see that this is not great
* As an initial pass retry the ones highlighted with different training params
* TABLE OF MLP WITH EACH DATASET
* IMPROVE BY SELECTING BEST RESULT AND TWEAKING WITH PARMAS
* THEN TRY BEST RESULT WITH FITNET
* TWEAK PARAMS
* DISCUSS CONCLUSIONS