Report 3

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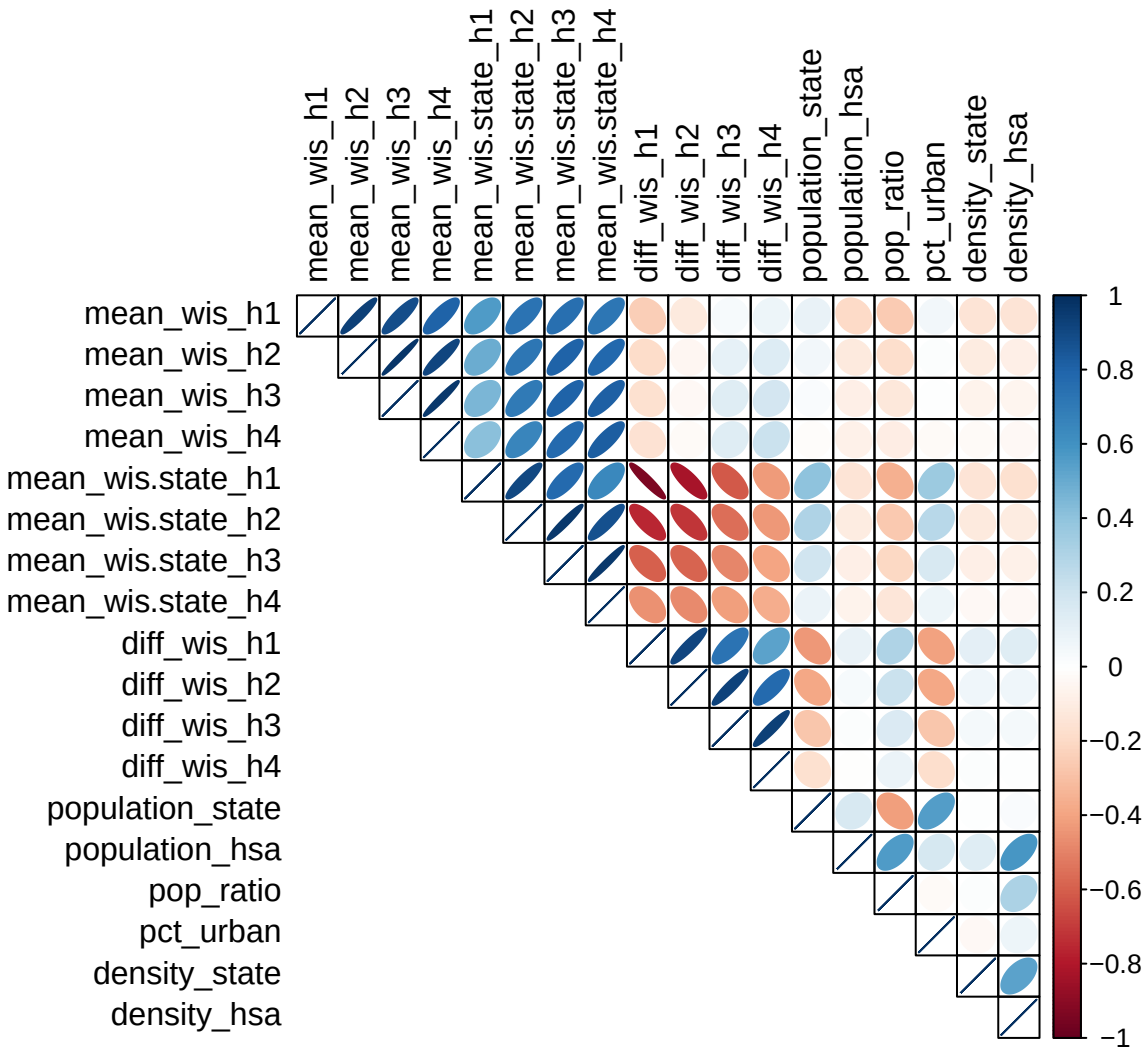
Contents

Introduction

This week, I plan to use the methods I mentioned last week to estimate the WIS differences. I'll process and prepare the data and then apply several models to try and see which work best.

Data processing

Load and preprocess data (borrowed from other file)



Support Vector Regression (SVR)

Theoretical background

Implementation

Bayesian Additive Regression Trees

Theoretical background

Implementation

```
##
## Attaching package: 'dbarts'

## The following object is masked from 'package:tidyr':
##
##     extract

##
## Running BART with numeric y
##
## number of trees: 200
## number of chains: 1, default number of threads 1
## tree thinning rate: 1
## Prior:
##  k prior fixed to 2.000000
##  degrees of freedom in sigma prior: 3.000000
##  quantile in sigma prior: 0.900000
##  scale in sigma prior: 0.002449
##  power and base for tree prior: 2.000000 0.950000
##  use quantiles for rule cut points: false
##  proposal probabilities: birth/death 0.50, swap 0.10, change 0.40; birth 0.50
## data:
##  number of training observations: 173
##  number of test observations: 0
##  number of explanatory variables: 6
##  init sigma: 0.241445, curr sigma: 0.241445
##
## Cutoff rules c in x<=c vs x>c
## Number of cutoffs: (var: number of possible c):
## (1: 100) (2: 100) (3: 100) (4: 100) (5: 100)
## (6: 100)
## Running mcmc loop:
## iteration: 100 (of 1000)
## iteration: 200 (of 1000)
## iteration: 300 (of 1000)
## iteration: 400 (of 1000)
## iteration: 500 (of 1000)
## iteration: 600 (of 1000)
## iteration: 700 (of 1000)
## iteration: 800 (of 1000)
```

```
## iteration: 900 (of 1000)
## iteration: 1000 (of 1000)
## total seconds in loop: 0.687897
##
## Tree sizes, last iteration:
## [1] 2 1 3 2 2 2 2 2 2 1 2 1 2 2 2 3 4 3
## 2 3 2 3 2 1 2 2 2 3 2 2 2 3 2 3 2 3 2 2
## 2 3 3 3 3 2 2 2 2 2 3 2 2 2 3 2 3 1 3 2
## 2 2 2 2 2 3 2 2 3 1 2 2 2 3 2 2 3 2 2 2
## 3 2 3 3 2 4 3 3 2 2 2 3 2 2 2 2 1 2 2 2
## 2 2 2 3 2 2 2 2 2 3 3 2 2 2 3 2 2 2 3 2
## 3 1 4 2 2 2 3 2 2 3 2 2 2 3 2 1 2 2 2 2
## 3 3 2 2 2 4 2 3 2 3 2 2 6 2 2 2 2 3 2 3
## 2 4 2 2 3 2 5 2 2 2 4 2 2 2 2 3 3 2 2 3
## 2 2 2 2 2 2 2 2 3 2 2 2 2 2 2 3 2 2 1 1
## 2 3
##
## Variable Usage, last iteration (var:count):
## (1: 44) (2: 43) (3: 40) (4: 39) (5: 45)
## (6: 46)
## DONE BART
```

```
##             [,1]        [,2]       [,3]        [,4]       [,5]       [,6]
## 2.5%  -0.2416658 -0.25808047 -0.1966868 -0.35732328 -0.1551812 -0.1647395
## 97.5%  0.2545783  0.07130976  0.1525115  0.02938555  0.1642894  0.1052325
##             [,7]       [,8]       [,9]      [,10]       [,11]      [,12]
## 2.5%  -0.2387110 -0.3273684 -0.2907711 -0.3600835 -0.35522993 -0.2902068
## 97.5%  0.2516585  0.2402306  0.1755243 -0.1114113 -0.05992831  0.1659123
##            [,13]       [,14]      [,15]      [,16]      [,17]      [,18]
## 2.5%  -0.38504449 -0.38580825 -0.3655741 -0.3639036 -0.3482085 -0.3766889
## 97.5% -0.02354347 -0.08145187 -0.1200178 -0.1225404 -0.1046574 -0.1177111
##            [,19]       [,20]       [,21]       [,22]      [,23]      [,24]
## 2.5%  -0.2029184 -0.28668777 -0.35003247 -0.33976224 -0.3376100 -0.3207528
## 97.5%  0.1786149  0.06655969 -0.06568235 -0.04142515  0.3162668 -0.0206462
##             [,25]       [,26]       [,27]       [,28]       [,29]      [,30]
## 2.5%  -0.37044959 -0.27594471 -0.35337593 -0.32454907 -0.34950655 -0.2890773
## 97.5% -0.05968655  0.08674473 -0.05437129 -0.05446595  0.07378893  0.1050162
##             [,31]       [,32]      [,33]       [,34]      [,35]      [,36]
## 2.5%  -0.19267750 -0.20930743 -0.2196624 -0.19151905 -0.1890188 -0.1920772
## 97.5%  0.06530678  0.07446125  0.1410801  0.05976847  0.1149380  0.1045320
##             [,37]       [,38]      [,39]      [,40]      [,41]      [,42]
## 2.5%  -0.26633457 -0.25570423 -0.1836760 -0.2018145 -0.1950567 -0.1448781
## 97.5%  0.02978598  0.05436827  0.1355302  0.1071587  0.1173190  0.2050461
##            [,43]       [,44]      [,45]      [,46]       [,47]      [,48]
## 2.5%  -0.1904417 -0.22914090 -0.2278026 -0.2873568 -0.35456827 -0.2653765
## 97.5%  0.1322044  0.07717778  0.1280606  0.1188273  0.01177875  0.1995744
##            [,49]      [,50]      [,51]      [,52]      [,53]      [,54]
## 2.5%  -0.2182152 -0.2431115 -0.2280970 -0.2568184 -0.2142867 -0.2436554
## 97.5%  0.1837688  0.2345620  0.1637914  0.2870583  0.2214133  0.1995697
##            [,55]      [,56]      [,57]       [,58]       [,59]        [,60]
## 2.5%  -0.1961189 -0.2575026 -0.2809619 -0.34003978 -0.31048883 -0.306985114
## 97.5%  0.2542475  0.1680519  0.2343238 -0.08140749 -0.07091346  0.002456016
##             [,61]       [,62]       [,63]       [,64]       [,65]       [,66]
## 2.5%  -0.31580672 -0.31901891 -0.31596085 -0.34178623 -0.32310801 -0.32214416
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```
## 97.5% -0.06035403 -0.06817819 -0.06179707 -0.07018699 -0.07498986 -0.08164348
##             [,67]       [,68]      [,69]       [,70]       [,71]      [,72]
## 2.5%  -0.35350371 -0.32381546 -0.2313770 -0.18383144 -0.16970440 -0.2154314
## 97.5% -0.05168337  0.01114855  0.1886692  0.07028155  0.08249651  0.1005389
##           [,73]      [,74]      [,75]      [,76]      [,77]       [,78]
## 2.5%  -0.2533876 -0.1833747 -0.1768555 -0.1984634 -0.3811604 -0.27467262
## 97.5%  0.0542860  0.1120301  0.2024161  0.1345941  0.2022174  0.09289007
##            [,79]      [,80]      [,81]      [,82]      [,83]       [,84]
## 2.5%  -0.39154874 -0.3955210 -0.2743560 -0.2589041 -0.2968263 -0.36509501
## 97.5%  0.02902465  0.2163839  0.1559377  0.3006053  0.1378153  0.05838687
##           [,85]      [,86]      [,87]       [,88]       [,89]      [,90]
## 2.5%  -0.2763127 -0.2380109 -0.3562541 -0.25249325 -0.23870835 -0.2635734
## 97.5%  0.1981251  0.2629772  0.1876801  0.05531736  0.06043356  0.1534914
##           [,91]       [,92]       [,93]       [,94]      [,95]       [,96]
## 2.5%  -0.3115238 -0.24842441 -0.23178887 -0.31566621 -0.2523166 -0.2519711
## 97.5%  0.0960721  0.07989158  0.05031025  0.01878206  0.2309207  0.1042851
##            [,97]      [,98]      [,99]     [,100]     [,101]     [,102]
## 2.5%  -0.24467191 -0.2368815 -0.3928057 -0.5634264 -0.3959606 -0.403229
## 97.5%  0.05094787  0.2133710 -0.1198274 -0.1826825 -0.1544143 -0.144226
##           [,103]     [,104]     [,105]     [,106]     [,107]     [,108]
## 2.5%  -0.38994131 -0.3920153 -0.45912968 -0.3778258 -0.4092270 -0.4087913
## 97.5% -0.06715216 -0.1358017 -0.09843512 -0.1286497 -0.1590626 -0.1578292
##           [,109]     [,110]     [,111]     [,112]     [,113]     [,114]
## 2.5%  -0.3856734 -0.3954740 -0.3930856 -0.3784545 -0.1930525 -0.1797818
## 97.5% -0.1350357 -0.1410594 -0.1547908 -0.1380237  0.1910213  0.1311005
##           [,115]      [,116]      [,117]     [,118]     [,119]      [,120]
## 2.5%  -0.1960443 -0.22489919 -0.27038859 -0.1437195 -0.2268351 -0.24305518
## 97.5%  0.2162181  0.07670597  0.04520275  0.1509476  0.0993096  0.09440085
##           [,121]      [,122]     [,123]      [,124]      [,125]      [,126]
## 2.5%  -0.24147582 -0.24051244 -0.1817788 -0.17356819 -0.25879697 -0.31046090
## 97.5%  0.06741475  0.07522477  0.0793506  0.09655761  0.04634202  0.02547516
##            [,127]      [,128]      [,129]      [,130]      [,131]      [,132]
## 2.5%  -0.265502009 -0.20390895 -0.20707529 -0.22853723 -0.21666827 -0.27008179
## 97.5%  0.006984369  0.03463704  0.03387832  0.03129868  0.02992799  0.02959457
##           [,133]     [,134]     [,135]     [,136]     [,137]     [,138]
## 2.5%  -0.8914230 -0.7456373 -0.7399680 -0.6937382 -0.6579789 -0.8051809
## 97.5% -0.4973848 -0.3273110 -0.1146998 -0.1847530 -0.3268748 -0.3150312
##           [,139]     [,140]     [,141]     [,142]     [,143]     [,144]
## 2.5%  -0.7483448 -1.1070101 -0.8074219 -0.6866675 -0.6457818 -0.6895850
## 97.5% -0.3237732 -0.5983413 -0.3521838 -0.2641549 -0.3194416 -0.3505491
##           [,145]     [,146]     [,147]     [,148]     [,149]     [,150]
## 2.5%  -0.8408310 -0.6666038 -0.6666038 -0.6701817 -0.8268634 -0.6569294
## 97.5% -0.3038379 -0.3419711 -0.3419711 -0.2850401 -0.4560057 -0.2432299
##           [,151]     [,152]     [,153]     [,154]     [,155]     [,156]
## 2.5%  -1.0133550 -0.7278296 -1.1744222 -0.2364846 -0.2246209 -0.1877687
## 97.5% -0.5419409 -0.3149624 -0.6705427  0.0932734  0.1954374  0.1218984
##           [,157]      [,158]      [,159]      [,160]     [,161]      [,162]
## 2.5%  -0.2963324 -0.35352621 -0.30990347 -0.37643595 -0.2778281 -0.29115020
## 97.5%  0.1519696 -0.02022135 -0.01823814 -0.03566538  0.1978167 -0.01329134
##            [,163]      [,164]      [,165]      [,166]      [,167]     [,168]
## 2.5%  -0.27862468 -0.283697442 -0.35072249 -0.31657737 -0.15639089 -0.2574869
## 97.5%  0.09110974  0.006340775 -0.02525113  0.04569754  0.09277599  0.1783540
##           [,169]     [,170]     [,171]      [,172]     [,173]
## 2.5%  -0.27445176 -0.2008294 -0.1659758 -0.16857136 -0.1676966
```

```
## 97.5%  0.01451989  0.1134432  0.1128769  0.08876486  0.1517469
```

Elastic Net / LASSO / Ridge

Theoretical background

Implementation

Conclusion