Final Project AIC Version

MBA 694

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## Introduction

Table 1: Quantitative Variables

|  | n | mean | sd | median | min | max | range | se |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| HHAGE | 5686 | 52.297 | 17.015 | 53 | 18 | 85 | 67 | 0.226 |
| VCR | 5686 | 0.269 | 0.673 | 0 | -2 | 5 | 7 | 0.009 |
| PLAYSTA | 5686 | 0.500 | 0.971 | 0 | -2 | 10 | 12 | 0.013 |
| TVSIZE1 | 5686 | 2.469 | 1.061 | 3 | -2 | 4 | 6 | 0.014 |
| TVCOLOR | 5686 | 2.362 | 1.293 | 2 | 0 | 9 | 9 | 0.017 |
| CROCKPOT | 5686 | 0.284 | 0.451 | 0 | 0 | 1 | 1 | 0.006 |
| TOAST | 5686 | 0.638 | 0.481 | 1 | 0 | 1 | 1 | 0.006 |
| OUTGRILL | 5686 | 0.615 | 0.487 | 1 | 0 | 1 | 1 | 0.006 |
| MICRO | 5686 | 1.014 | 0.305 | 1 | 0 | 7 | 7 | 0.004 |

Table ##: Variable Name

| VCR | Freq |
| --- | --- |
| -2 | 136 |
| 0 | 4010 |
| 1 | 1327 |
| 2 | 173 |
| 3 | 33 |
| 4 | 5 |
| 5 | 2 |

Table ##: Variable Name

| PLAYSTA | Freq |
| --- | --- |
| -2 | 136 |
| 0 | 3446 |
| 1 | 1434 |
| 2 | 455 |
| 3 | 135 |
| 4 | 51 |
| 5 | 17 |
| 6 | 10 |
| 8 | 1 |
| 10 | 1 |

Table ##: Variable Name

| TVSIZE1 | Freq |
| --- | --- |
| -2 | 136 |
| 1 | 638 |
| 2 | 1558 |
| 3 | 2858 |
| 4 | 496 |

Table ##: Variable Name

| TVCOLOR | Freq |
| --- | --- |
| 0 | 136 |
| 1 | 1404 |
| 2 | 1898 |
| 3 | 1298 |
| 4 | 597 |
| 5 | 235 |
| 6 | 73 |
| 7 | 29 |
| 8 | 14 |
| 9 | 2 |

Table ##: Variable Name

| CROCKPOT | Freq |
| --- | --- |
| 0 | 4070 |
| 1 | 1616 |

Table ##: Variable Name

| TOAST | Freq |
| --- | --- |
| 0 | 2056 |
| 1 | 3630 |

Table ##: Variable Name

| OUTGRILL | Freq |
| --- | --- |
| 0 | 2191 |
| 1 | 3495 |

Table ##: Variable Name

| MICRO | Freq |
| --- | --- |
| 0 | 194 |
| 1 | 5239 |
| 2 | 238 |
| 3 | 13 |
| 4 | 1 |
| 7 | 1 |

### Research Question

Can the small household appliances in a home be used to predict the age of the homeowner?

## Statistical Analysis

## Statistical Results

Table ##: Reduced Models

|  | (Intercept) | CROCKPOT | MICRO | OUTGRILL | PLAYSTA | TOAST | TVCOLOR | TVSIZE1 | VCR | R^2 | adjRsq | df | logLik | AIC | delta | weight |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 255 | 47.55655 | -1.302798 | 4.008528 | -0.8882606 | -6.644627 | 2.540468 | 1.210842 | -0.6482951 | 7.564295 | 0.2038797 | 0.2027578 | 10 | -23534.14 | 47088.28 | 0.000000 | 6.840605e-01 |
| 251 | 47.43106 | -1.414960 | 3.965623 | NA | -6.661679 | 2.473968 | 1.141651 | -0.7021246 | 7.572402 | 0.2033173 | 0.2023351 | 9 | -23536.15 | 47090.30 | 2.015377 | 2.497243e-01 |
| 254 | 47.42831 | NA | 4.003361 | -1.0427260 | -6.696265 | 2.419194 | 1.200463 | -0.6549442 | 7.573011 | 0.2027437 | 0.2017608 | 9 | -23538.20 | 47094.39 | 6.107613 | 3.227329e-02 |
| 191 | 46.48723 | -1.317171 | 3.917205 | -1.0485160 | -6.836945 | 2.535366 | 1.134249 | NA | 7.356369 | 0.2026577 | 0.2016747 | 9 | -23538.50 | 47095.01 | 6.721097 | 2.374798e-02 |
| 250 | 47.26560 | NA | 3.951698 | NA | -6.721885 | 2.327500 | 1.116941 | -0.7197770 | 7.583568 | 0.2019569 | 0.2011137 | 8 | -23541.00 | 47098.00 | 9.716245 | 5.311763e-03 |
| 187 | 46.23045 | -1.453013 | 3.856701 | NA | -6.876516 | 2.455166 | 1.043712 | NA | 7.345396 | 0.2018621 | 0.2010188 | 8 | -23541.34 | 47098.68 | 10.391598 | 3.789550e-03 |
| 190 | 46.34646 | NA | 3.911033 | -1.2063651 | -6.891153 | 2.412688 | 1.122960 | NA | 7.363027 | 0.2014963 | 0.2006527 | 8 | -23542.64 | 47101.28 | 12.996710 | 1.030137e-03 |
| 186 | 46.02940 | NA | 3.839579 | NA | -6.943933 | 2.304172 | 1.015789 | NA | 7.351005 | 0.2004266 | 0.1997227 | 7 | -23546.45 | 47106.89 | 18.609052 | 6.225729e-05 |
| 253 | 51.03298 | -1.295505 | NA | -0.8048671 | -6.653834 | 2.661331 | 1.330358 | -0.5886732 | 7.684836 | 0.1989467 | 0.1979591 | 9 | -23551.70 | 47121.41 | 33.123613 | 4.389280e-08 |
| 239 | 48.57890 | -1.032379 | 4.199483 | -0.6840487 | -6.656259 | NA | 1.284725 | -0.6430324 | 7.645559 | 0.1989402 | 0.1979526 | 9 | -23551.73 | 47121.45 | 33.169345 | 4.290055e-08 |
| 235 | 48.46094 | -1.124762 | 4.162369 | NA | -6.669235 | NA | 1.229621 | -0.6848442 | 7.650193 | 0.1986047 | 0.1977580 | 8 | -23552.92 | 47121.84 | 33.550662 | 3.545364e-08 |
| 249 | 50.88541 | -1.397309 | NA | NA | -6.669211 | 2.599840 | 1.266441 | -0.6380768 | 7.691019 | 0.1984844 | 0.1976376 | 8 | -23553.34 | 47122.69 | 34.403629 | 2.314416e-08 |
| 238 | 48.43720 | NA | 4.188051 | -0.8154793 | -6.697145 | NA | 1.273595 | -0.6485551 | 7.649431 | 0.1982197 | 0.1973726 | 8 | -23554.28 | 47124.57 | 36.281106 | 9.052165e-09 |
| 234 | 48.27874 | NA | 4.141791 | NA | -6.717321 | NA | 1.205546 | -0.6998719 | 7.655472 | 0.1977345 | 0.1970283 | 7 | -23556.00 | 47126.01 | 37.721199 | 4.405956e-09 |
| 189 | 49.98789 | -1.308735 | NA | -0.9524186 | -6.828641 | 2.654183 | 1.258186 | NA | 7.493137 | 0.1979370 | 0.1970896 | 8 | -23555.29 | 47126.57 | 38.286066 | 3.321857e-09 |

Table ##: Reduced Model Coefficients

|  | Estimate | Std. Error | t value | Pr(>|t|) |
| --- | --- | --- | --- | --- |
| (Intercept) | 47.5565513 | 0.8628187 | 55.117664 | 0.0000000 |
| VCR | 7.5642946 | 0.3207810 | 23.580867 | 0.0000000 |
| PLAYSTA | -6.6446266 | 0.2373888 | -27.990483 | 0.0000000 |
| TVSIZE1 | -0.6482951 | 0.2196163 | -2.951944 | 0.0031707 |
| TVCOLOR | 1.2108419 | 0.1807166 | 6.700225 | 0.0000000 |
| CROCKPOT | -1.3027978 | 0.4577408 | -2.846147 | 0.0044410 |
| TOAST | 2.5404683 | 0.4280591 | 5.934854 | 0.0000000 |
| OUTGRILL | -0.8882606 | 0.4435520 | -2.002608 | 0.0452669 |
| MICRO | 4.0085285 | 0.6758625 | 5.930982 | 0.0000000 |

## Conclusion

# Appendix

## Appendix A (Code and Output):

# require(parallel)  
# require(snow)  
# https://stackoverflow.com/q/55858799  
#detects number of cores available to use for parallel package  
# nCores <- detectCores(logical = FALSE)  
# cat(nCores, " cores detected.")   
  
# detect threads with parallel()  
# nThreads<- detectCores(logical = TRUE)  
# cat(nThreads, " threads detected.")  
  
clusterType <- if(length(find.package("snow", quiet = TRUE))) "SOCK" else "PSOCK"  
  
clust <- try(makeCluster(getOption("cl.cores", 11), type = clusterType))  
  
# Need to remove Categorical Variables  
  
#Describe all quantitative variables at once  
quantVariableNames <- c("HHAGE","VCR","PLAYSTA","TVSIZE1","TVCOLOR","CROCKPOT","TOAST","OUTGRILL","MICRO")  
  
kable(describe(recs2015data\_full[,quantVariableNames])[,-c(1,6:7,11:12)], digits=3,  
 caption="Table 1: Quantitative Variables")  
  
# Describe categorical variables, have to do them one at a time.  
  
# "HHAGE","VCR","PLAYSTA","TVSIZE1","TVCOLOR","CROCKPOT","TOAST","OUTGRILL","MICRO"  
  
kable(tally(~VCR, data=recs2015data\_full), row.names=FALSE, caption="Table ##: Variable Name")  
  
kable(tally(~PLAYSTA, data=recs2015data\_full), row.names=FALSE, caption="Table ##: Variable Name")  
  
kable(tally(~TVSIZE1, data=recs2015data\_full), row.names=FALSE, caption="Table ##: Variable Name")  
  
kable(tally(~TVCOLOR, data=recs2015data\_full), row.names=FALSE, caption="Table ##: Variable Name")  
  
kable(tally(~CROCKPOT, data=recs2015data\_full), row.names=FALSE, caption="Table ##: Variable Name")  
  
kable(tally(~TOAST, data=recs2015data\_full), row.names=FALSE, caption="Table ##: Variable Name")  
  
kable(tally(~OUTGRILL, data=recs2015data\_full), row.names=FALSE, caption="Table ##: Variable Name")  
  
kable(tally(~MICRO, data=recs2015data\_full), row.names=FALSE, caption="Table ##: Variable Name")  
  
  
  
allVariables <- c("HHAGE","VCR","PLAYSTA","TVSIZE1","TVCOLOR","CROCKPOT","TOAST","OUTGRILL","MICRO")  
  
recs2015data\_subset <- recs2015data\_full[,allVariables]  
  
# Remove rows where there is any missing data  
recs2015\_subset\_complete <- na.omit(recs2015data\_subset)  
  
reducedModel\_comp <- lm(HHAGE ~ VCR + PLAYSTA + TVSIZE1 +   
 TVCOLOR + CROCKPOT +   
 TOAST + OUTGRILL + MICRO,   
 data=recs2015\_subset\_complete)  
options(na.action="na.fail", width=120)  
  
  
clusterExport(clust, "recs2015\_subset\_complete")  
  
aicOutput\_reduced <- dredge(reducedModel\_comp, cluster = clust, rank="AIC",  
 extra=c("R^2",adjRsq=function(x) summary(x)$adj.r.squared))  
# extra=c("R^2",adjRsq=function(x) summary(x)$adj.r.squared)  
  
  
  
  
# head(aicOutput\_reduced,n=15)  
kable(head(aicOutput\_reduced,n=15),caption="Table ##: Reduced Models")  
  
kable(summary(reducedModel\_comp)$coefficients,caption="Table ##: Reduced Model Coefficients")

## Appendix B (Packages):

The R package rmarkdown (Allaire et al. 2022) was used to create this report document using the R language (R Core Team 2022). In addition, the following were packages used for the analysis and/or formatting of this document:

Allaire, JJ, Yihui Xie, Jonathan McPherson, Javier Luraschi, Kevin Ushey, Aron Atkins, Hadley Wickham, Joe Cheng, Winston Chang, and Richard Iannone. 2022. *Rmarkdown: Dynamic Documents for r*. <https://CRAN.R-project.org/package=rmarkdown>.

Pruim, Randall, Daniel T. Kaplan, and Nicholas J. Horton. 2021. *Mosaic: Project MOSAIC Statistics and Mathematics Teaching Utilities*. <https://CRAN.R-project.org/package=mosaic>.

Pruim, Randall, Daniel T Kaplan, and Nicholas J Horton. 2017. “The Mosaic Package: Helping Students to ’Think with Data’ Using r.” *The R Journal* 9 (1): 77–102. [https://journal.r-project.org/archive/2017/ RJ-2017-024/index.html](https://journal.r-project.org/archive/2017/     RJ-2017-024/index.html).

R Core Team. 2022. *R: A Language and Environment for Statistical Computing*. Vienna, Austria: R Foundation for Statistical Computing. <https://www.R-project.org/>.

Wickham, Hadley. 2021. *Tidyverse: Easily Install and Load the Tidyverse*. <https://CRAN.R-project.org/package=tidyverse>.

Wickham, Hadley, Mara Averick, Jennifer Bryan, Winston Chang, Lucy D’Agostino McGowan, Romain François, Garrett Grolemund, et al. 2019. “Welcome to the tidyverse.” *Journal of Open Source Software* 4 (43): 1686. <https://doi.org/10.21105/joss.01686>.

Xie, Yihui. 2014. “Knitr: A Comprehensive Tool for Reproducible Research in R.” In *Implementing Reproducible Computational Research*, edited by Victoria Stodden, Friedrich Leisch, and Roger D. Peng. Chapman; Hall/CRC. [http://www.crcpress.com/product/isbn/ 9781466561595](http://www.crcpress.com/product/isbn/     9781466561595).

———. 2015. *Dynamic Documents with R and Knitr*. 2nd ed. Boca Raton, Florida: Chapman; Hall/CRC. <https://yihui.org/knitr/>.

———. 2022. *Knitr: A General-Purpose Package for Dynamic Report Generation in r*. <https://yihui.org/knitr/>.

Xie, Yihui, J. J. Allaire, and Garrett Grolemund. 2018. *R Markdown: The Definitive Guide*. Boca Raton, Florida: Chapman; Hall/CRC. <https://bookdown.org/yihui/rmarkdown>.

Xie, Yihui, Christophe Dervieux, and Emily Riederer. 2020. *R Markdown Cookbook*. Boca Raton, Florida: Chapman; Hall/CRC. <https://bookdown.org/yihui/rmarkdown-cookbook>.