**Fall 2016, HS 853 (Scientific Methods for Health Sciences: Special Topics)**

**Take-home Midterm Exam (Due: 11/04/16)**

Use case-study 6 available here (<https://umich.instructure.com/courses/38100/files/folder/Case_Studies>): Computer Assisted Quality of Life and Symptom Assessment for Patients with Chronic Illness Using Survey Data (<http://doi.org/10.3886/ICPSR34543.v1>).

1. **Reproduce and explain the following graphs**

|  |  |
| --- | --- |
|  |  |
| hist(ChronicDisease\_QoL\_data1$CHRONICDISEASESCORE), select only Dx>=1 | ChronicDisease\_QoL\_data1$AGE vs. ChronicDisease\_QoL\_data1$CHRONICDISEASESCORE |
|  |  |
| AGE vs. CHRONICDISEASESCORE by QOL\_Q\_01 level |  |

1. **Among patients with chronic illness (CHRONICDISEASESCORE1), are QoL scores (PROMIS-QOL scale) strongly correlated with comorbidity indices (provider-reported)?**

|  |  |  |
| --- | --- | --- |
| PROMIS-QOL (global quality of life) | 1. Excellent 2. Very good 3. Good 4. Fair 5. Poor 6. No answer (Patient refused) | QOL\_Q\_01 Health rating  QOL\_Q\_02 Quality of life rating  QOL\_Q\_03 Physical health rating  QOL\_Q\_04 Mental health rating  QOL\_Q\_05 Satisfaction with social activities and relationships rating  QOL\_Q\_06 Extent able to carry out every day physical activities  QOL\_Q\_07 Pain rating in the past seven days |
| (provider-reported) Charlson Comorbidity Index | Numeric 0-10  (-9 indicates missing score) | CHARLSON\_SCORE [calculated using ICD9 codes from EMR for prior 3 months] |
| MSAS-SF (Memorial Symptom Assessment- Short Form) | 1 No, not at all 2 Yes, a little bit  3 Yes, somewhat 4 Yes, quite a bit 5 Yes, very much 6 No answer (Patient refused) | MSA\_Q\_01 Lack of energy in the past week MSA\_Q\_02 Pain in the past week  MSA\_Q\_03 Cough in the past week  MSA\_Q\_04 Dry mouth in the past week MSA\_Q\_05 Nausea in the past week MSA\_Q\_06 Feel drowsy in the past week  MSA\_Q\_07 Feel bloated in the past week  MSA\_Q\_08 Vomiting in the past week  MSA\_Q\_09 Shortness of breath in the past week MSA\_Q\_10 Diarrhea in the past week  MSA\_Q\_11 Problems with sexual interest or activity in the past week  MSA\_Q\_12 Itching in the past week  MSA\_Q\_13 Problems with lack of appetite in the past week  MSA\_Q\_14 Problems with dizziness in the past week  MSA\_Q\_15 Problems with changes in the way food tastes in the past week  MSA\_Q\_16 Problems with weight loss in the past week  MSA\_Q\_17 Problems with constipation in the past week |
| Chronic Disease Score | Numeric 0-19  (-9 indicates missing score) | CHRONIC\_DISEASE\_SCORE [calculated using medication orders from EMR for prior 6 months] |
| See variable definitions here: <http://www.icpsr.umich.edu/icpsrweb/AHRQMCC/ssvd/studies/34543/variables> | | |

1. **Is the Charlson Comorbidity Index strongly correlated with patient-reported symptom burden (MSAS-SF)?**

**Appendix**

Include your complete R-code and other technical content. Below are some code snippets that may be helpful.

ChronicDisease\_QoL\_data <- read.csv('https://umich.instructure.com/files/481332/download?download\_frd=1', header=T)

attach(ChronicDisease\_QoL\_data); head(ChronicDisease\_QoL\_data)

…

…

…

ChronicDisease\_QoL\_data1 <- ChronicDisease\_QoL\_data[ChronicDisease\_QoL\_data [,41] >=1 & ChronicDisease\_QoL\_data [,41] <4,]

hist(ChronicDisease\_QoL\_data1$CHRONICDISEASESCORE)

require(ggplot2)

# library("reshape2")

# data.m <- melt(data.m, id.var = "RACE\_ETHNICITY")

# ggplot(data = data.m, aes(x=variable, y=value)) +

# geom\_boxplot(aes(fill=RACE\_ETHNICITY))

# ggplot(data = data.m, aes(x= RACE\_ETHNICITY, y=value)) +

# geom\_boxplot() + facet\_wrap(~variable,ncol = 4)

#

# p <- ggplot(data = data.m, aes(x=variable, y=value))

# p <- p + geom\_boxplot(aes(fill = RACE\_ETHNICITY))

# to color the points replace group with color= RACE\_ETHNICITY

# p <- p + geom\_point(aes(y=value, group= RACE\_ETHNICITY), position =

# position\_dodge(width=0.75))

# p <- p + facet\_wrap( ~ variable, scales="free")

# p <- p + xlab("x-axis") + ylab("y-axis") + ggtitle("Title")

# p <- p + guides(fill=guide\_legend(title="Legend\_Title"))

# p

plot.2 <- qplot(ChronicDisease\_QoL\_data1$AGE , ChronicDisease\_QoL\_data1$CHRONICDISEASESCORE, data = ChronicDisease\_QoL\_data1, geom = c("point", "smooth"), method = "lm")

plot.3 <- qplot(ChronicDisease\_QoL\_data1$AGE , ChronicDisease\_QoL\_data1$AGE, data= ChronicDisease\_QoL\_data1, geom=c("point", "smooth"), span=0.4)

print(plot.2); print(plot.3)

plot.4 <- ggplot(ChronicDisease\_QoL\_data1, aes(AGE, CHRONICDISEASESCORE, group=SEX, color= SEX)) + geom\_line()

print(plot.4)

plot.5 <- ggplot(ChronicDisease\_QoL\_data1, aes(AGE, CHRONICDISEASESCORE, group = QOL\_Q\_01)) + geom\_line(aes(color=QOL\_Q\_01), size=1) + facet\_wrap(~QOL\_Q\_01, ncol=1)

print(plot.5)

# AGE vs. CHRONICDISEASESCORE by QOL\_Q\_01 level

# df <- data.frame(ChronicDisease\_QoL\_data1)

# ggplot(data=df, aes(AGE, CHRONICDISEASESCORE, colour= QOL\_Q\_01))

# + geom\_line() + geom\_line(size=0.5) + labs(x='Age', y='Values')

plot.5 <- ggplot(ChronicDisease\_QoL\_data1, aes(AGE, CHRONICDISEASESCORE, group = QOL\_Q\_01)) + geom\_line(aes(color=QOL\_Q\_01), size=1) + facet\_wrap(~QOL\_Q\_01, ncol=1) + scale\_colour\_gradientn(colours=**rainbow**(6))

print(plot.5)

plot.6 <- ggplot(ChronicDisease\_QoL\_data1, aes(AGE, CHRONICDISEASESCORE)) + geom\_line(aes(color=QOL\_Q\_01), size=1) + facet\_grid(. ~ CHARLSONSCORE)

print(plot.6)

plot.5 <- ggplot(ChronicDisease\_QoL\_data1, aes(AGE, CHRONICDISEASESCORE)) + geom\_jitter(alpha = I(1 / 2), aes(color= CHARLSONSCORE))

print(plot.5)

plot.5 <- ggplot(diamonds, aes(CHRONICDISEASESCORE, AGE)) + geom\_jitter(alpha = I(1 / 2), aes(color=QOL\_Q\_01))

print(plot.5)

(Remember to include the [HW header](http://www.socr.umich.edu/people/dinov/2016/Fall/HS853/HW_header.html) identifying you on top of your report)