Spring 2016 Louisiana ASA Chapter Meeting

Friday, 22 April 2016

Tureaud Hall, room 109
Louisiana State University
Baton Rouge

Schedule

9:30-10:00 Reception

10:00-10:30
A Nonparametric Test of Independence Between Two Variables
Bin Li
Louisiana State University

10:30-11:00
Exploring the Racial Disparity in Health-related Quality of Life among Young Breast Cancer Survivors in Louisiana
Ruijuan Gao and Qingzhao Yu
Department of Biostatistics
LSU School of Public Health
New Orleans

11:00-11:30
A (Gentle) Introduction to Statistics
Brian D. Marx
Louisiana State University

11:30-11:45
Break

11:45-12:15
On Improved Estimation Under Weibull Model
Nabendu Pal
University of Louisiana at Lafayette

12:15-12:45
Analyzing partially paired data
BeiBei Guo
Louisiana State University

12:45-1:15
General Multiple Mediation Analysis To Examine Ethnic Differences in Anxiety and Depression in Cancer Survivors Using the MY-Health Survey
Kaelen L. Medeiros
Department of Biostatistics
LSU School of Public Health
New Orleans
A Nonparametric Test of Independence Between Two Variables
Bin Li
Louisiana State University

A nonparametric statistic, called the roughness of concomitant ranks, is proposed for testing whether two quantitative vectors are dependent. Empirical evidence shows the new statistic is normally distributed with mean and variance are given in Theorem 1. The new testing procedure is highly computationally efficient and simple, and exhibits a competent empirical performance in simulations and two microarray data analysis. We apply the new method to deal with variable screening for high-dimensional data analysis. For low signal-to-noise ratio setting, we suggest to use data binning to increase the power of the test. Simulation results show the fine performance of the proposed method with existing screening methods.

Exploring the Racial Disparity in Health-related Quality of Life among Young Breast Cancer Survivors in Louisiana
Ruijuan Gao and Qingzhao Yu
Department of Biostatistics
LSU School of Public Health
New Orleans

This study was designed to compare survey results about the health-related quality of life (HRQoL) between African American (AA) and white young breast cancer survivors (YBCS), and to explore the rationale behind any difference. There were 22 common questions in the survey questionnaire. Principal component analysis (PCA) was applied to reduce the dimension of original variables among the 130 survey respondents. The resulting components were compared by ANOVA between AA and white groups to see if there were any difference. If there was significant difference, the multiple mediation analysis (MMA) was used to explore potential mediators associated with the racial disparity on HRQoL. Via PCA, the original 22 variables were reduced to 4 components, which could be interpreted as ”overall anxiety”, ”fertility-related anxiety”, ”anxiety on working ability but comfort on sex intimacy and body shape”, and ”comfort on body change”. Among the four components, AA group had significantly higher overall anxiety and fertility-related anxiety compared to white group. Therefore, overall anxiety and fertility-related anxiety were used for subsequent analysis with MMA. Census poverty level was identified as a significant mediator for fertility-related anxiety in MMA with linear regression method. BMI and age were found to be very close to significant mediators for overall anxiety and fertility-related anxiety respectively. Due to the sample size limitation, the study on mediation can only be considered as a pilot study, and further analysis will be performed when clinical information on more subjects are available in the project. The pilot study showed that the race disparity of health-related quality of life among young breast cancer survivors between AA and white could be partially explained by BMI, age, and census poverty level. The results would help improve the quality of life for YBCS and reduce the racial disparity in HRQoL by identifying the target for intervention.
A (Gentle) Introduction to Statistics
Brian D. Marx
Louisiana State University

One of the most rewarding activities of my recent career has been traveling around greater
Baton Rouge, as well as across Louisiana, to give a one-hour statistics presentation to high
school students. It is an interesting exercise and truly a challenge to imagine just how one
might use this time to really engage these young minds and even spark a lasting curiosity
about our wonderful field. A natural centerpiece is the binomial, which allows for playful
and thought-provoking examples, such as cheating, ESP, freedom, and death. But there
is so much more opportunity that I would like to share with you, while hopefully gaining
new ideas and constructive feedback.

On Improved Estimation Under Weibull Model
Nabendu Pal
University of Louisiana at Lafayette

This work deals with improved estimation of a Weibull (a) shape parameter, (b) scale
parameter, and (c) quantiles in a decision-theoretic setup. Though several convenient
types of estimators have been proposed in the literature, we rely only on the maximum
likelihood estimation of a parameter since it is based on the sufficient statistics (and hence
there is no loss of information). However, the MLEs of the above parameters do not
have closed expressions, and hence studying their exact sampling properties analytically
is impossible. To overcome this difficulty we follow the approach of second order risk of
estimators under the squared error loss function and study their second order optimality.
Among the interesting results that we have obtained, it has been shown that (a) the
MLE of the shape parameter is always second order inadmissible (and hence an improved
estimator has been proposed); (b) the MLE of the scale parameter is always second order
admissible; and (c) the MLE of the p-th quantile is second order inadmissible when p is
either close to 0, or close to 1. Further, simulation results have been provided to show the
extent of improvement over the MLE when second order improved estimators are found.

Analyzing partially paired data
BeiBei Guo
Louisiana State University

The paired t-test is routinely used for testing means for paired data. In practice, however,
data are often partially paired due to missing data. One commonly used approach to
analyze partially paired data is to discard the unpaired observations and use the paired
t-test for the remaining paired observations. This is the default choice for most available
statistical software that performs the paired t-test, but it is not efficient because it discards
part of the data. Another approach is to treat partially paired data as two independent
samples and use the two-sample t-test to compare the means. This approach utilizes all
available data, but ignores the correlation between the paired measurements, which may
result in a biased estimate of the variance and an inflated type I error rate. In this talk, I
will discuss some alternative approaches and compare their performance.
General Multiple Mediation Analysis To Examine Ethnic Differences in Anxiety and Depression in Cancer Survivors Using the MY-Health Survey

Kaelen L. Medeiros
Department of Biostatistics
LSU School of Public Health
New Orleans

In this thesis, we used the Measuring Your Health (MY-Health) survey, conducted in 2011-2013, with patients 6-9 months after cancer diagnosis, by four population-based SEER cancer registries with specific race- and age-based stratified sampling to ensure a diverse cancer survivor population, to examine self-reported anxiety and depression in Hispanic versus non-Hispanic survivors.

Generalized linear models were employed to determine if there is an ethnic disparity in anxiety and depression outcome scores, then general multiple mediation analysis to examine mediators in the pathway between ethnicity and the scores. Our goal was to take one step further than most analyses on cancer outcomes and quantify the separable effects each mediator has on anxiety and depression scores.

There was a significant difference in both scores by ethnicity ($p<.0001$ for both analyses), with the Hispanic group in general having higher scores. For anxiety score, the mediators included: education, age at diagnosis, age a person came to the U.S., insurance, social support, spirituality, and comorbidities. For depression score, mediators were the same, with the addition of cancer site. Ultimately, even after adjusting for all mediators and covariates, an ethnic disparity in both anxiety and depression score remains.

Our results show that cancer survivors should be screened for anxiety and depression past the diagnosis and treatment process. Target intervention should be given to those survivors (particularly Hispanics) with less education, private or government insurance, more comorbid conditions, and who were diagnosed at a younger age.