4th International Conference and Exhibition on
Biometrics & Biostatistics

November 16-18, 2015   San Antonio, USA

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Choice of agreement in medical imaging: Inter-rater, intra-rater reliability index or receiver operating curve or any other index to rely on

As advancement in medical imaging has revolutionized the healthcare industry and now burden rests on the shoulders of the biomedical researchers and clinicians to make fruitful inferences from these bulk of the data. The very fundamental question and the crux of the issue is how radiologists as observers could agree on some reliable indices such as intra or inter-rater agreement, Receiver-Operating Curve (ROC) or any other reliable index which would pave the way for making clinical decision in the prognosis of an illness, because FDA (Federal Drug Administration) also strongly requires in clinical trial studies to establish as well as support the efficacy of medical imaging agent. In this paper, an attempt has been made to discuss existing reliability indices such as Cohen kappa, weighted kappa, and kappa used in triage system as well as review has been done for other existing indices. Also, ROC has been discussed with or without any gold standard medical imaging modalities, since there are no unanimous regulations from the manufacturing industries. Using PROC IML, macros has been written to compute reliability index used in triage system which is based upon taking into account the severity of mis-triage in which the reliability index has been calculated by applying an alternative weighting method. Computed reliability indices such as simple kappa, weighted kappa, as well as triage kappa have been compared with those indices that are available in standard statistical software packages namely SAS, R, Stata, etc. Reliability indices based on Bayesian approach have also been discussed.

Biography

Altaf H Khan has completed three Master's degrees in Biostatistics (2004), Applied Mathematics (1999) and Mechanical Engineering (2003) from the University of Utah. Currently, he is working as a Senior Biostatistician at King Abdullah International Medical Research (National Guard Health Affairs), Riyadh (Saudi Arabia) and prior to that he worked at the University of Utah Hospital and Prince Sultan Cardiac Center. He has many publications in international journals and proceedings.

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J Appl Computat Math 2015
ISSN: 2168-9679, JACM an open access journal

Biostatistics 2015
November 16-18, 2015

Volume 4 Issue 5

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