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Statistical Methods in Medical Research

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Description

Before completing the doctoral dissertation in the 1950s and 1960s, a BIOSTAtistics doctoral student may be expected to have a very advanced understanding of the entire topic. This information would comprise the foundations of mathematics and probability. biostatistics and statistical inference theory proper—specifically, the theory and use of statistics to the fields of biology and medicine. Like in many other scientific disciplines, the widespread use of novel biostatistical approaches often occurs between a few years and two or three decades after their publication. For instance, although the Cox proportional hazards model was first proposed in 1972, it wasn't until the middle of the 1980s that it was widely used for survival analysis. Since SAS PROC MIXED was first made widely available in the 1990s, the current acceptance of mixed-effects regression models and longitudinal data analysis has trailed behind both their theoretical advancement by several decades and their theoretical progress.

We looked at recent issues of several prestigious statistical journals and tried to categorise their contents in order to determine, in general, where the discipline may be going. These summaries, we hope, will point the way to some topics that may become common practice in the near future, although we recognize that some others may fall by the wayside. In journals with high impact factors and an orientation that significantly overlaps with the fields of statistics and biostatistics, we tried to synthesise significant recent work. Although Biometrical is ranked 26th among statistics and probability journals, we included it due to its historical significance and because it is the next-highest ranked statistical journal in the field of biostatistics. Econometrical was also excluded because it is a specialised journal in a field unrelated to biostatistics. All the articles in the ten publications' most recent issues were thoroughly scanned by our team. We occasionally omitted specific parts that had nothing to do with biostatistics.

We are certain that the 583 articles we assessed constitute a good cross section of the most recent statistical publications in the subject of biostatistics, despite the fact that the number of articles per journal varied significantly. There were some difficulties with categorising the articles. A new approach for generalised linear models (GLM), a large field that includes as particular examples such diverse areas as analysis of variance and multiple linear, logistic, and Poisson regression models, can be developed, for instance, using Bayesian notions. Should we categorise such an article using Bayesian or regression analysis? Since it was typically where the attention was, we chose the former in the majority of these situations. This illustration shows the various choices we made about the subject overlap. These choices have unavoidably changed the categories' relative frequencies. The 10 categories we chose are shown along with their relative frequency. Except for "other," they are listed in decreasing order of frequency. Each category has articles with that subject as the primary focus, and many of them also include certain subcategories. In earlier editorials in this series, a number of themes were discussed. We merely mention the categories below in those circumstances. We provide a very succinct overview for categories that haven't been discussed before.

The nonparametric and semiparametric methods of inference, GLM, regression models, and variable selection fall under the group with the most frequency. Statistical techniques that analyse samples of curves, surfaces, pictures, and other functional observations are also included in functional data analysis. The most widely applied statistical technique at the moment is regression analysis, which is covered in other editorials in this series. The processing of time series data, spatialtemporal data (data scattered in time or space or both), data mining, and classification models (i.e., classifying an observation into one of several groups based on multiple measurements, such as a diagnosis) fall under the category of high-dimensional data. The next category includes general Bayesian analysis methodology as well as Bayesian approaches to ecology, stochastic processes, model selection, nonparametric analysis, and experimental design. More details about the Bayesian methods in statistics are available in an editorial in this series. The general inference category encompasses multivariate distributions and traditional statistical inference techniques like confidence intervals and hypothesis testing. Gene sequence, population genomics, and gene expression microarray data are only a few examples of the genetic data that can be analysed statistically. Methods to determine whether observable occurrences are the result of statistical association or a real causal relationship are referred to as causal inference; examples include the propensity score methods covered in this series [1-5].

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Conflict of Interest

The Author declares there is no conflict of interest associated with this manuscript.

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