A FLEXIBLE SPACE-TIME SCAN STATISTIC FOR DISEASE OUTBREAK DETECTION

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Early detection of disease outbreaks enables public health officials to implement disease control and prevention measures at the earliest possible time. A time periodic geographical disease surveillance system based on a cylindrical space-time scan statistic proposed by Kulldorff (2001) has been used extensively for disease surveillance along with the SaTScan software. On the other hand, many different tests have been proposed to detect purely spatial disease clusters. In particular, some spatial scan statistics such as those developed by Duczmal and Assunção (2004), Patil and Taillie (2004) and Tango and Takahashi (2005) are aimed at detecting arbitrarily shaped clusters which cannot be detected by the circular spatial scan statistic. Based on a *flexible spatial scan statistic* (Tango and Takahashi (2005)), we propose a flexible space-time scan statistic for early detection of disease outbreaks. Daily syndromic surveillance data in Massachusetts, USA, are used to illustrate the proposed test statistic. Power comparisons between the flexible and cylindrical space-time scan statistics are also presented. The flexible space-time scan statistic is well suited for detecting disease outbreaks in non-circular areas.