

The SAS/SaTScan Macro Accessory for Cartography (SMAC) Package

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OBJECTIVE

The purpose of this project was to create a SAS (SAS Institute, Cary, NC) interface for SaTScan [1] which can be used to create the necessary input files, run SaTScan directly from SAS (without using SaTScan's GUI), and to combine the output with geographic boundary files to create a single-page output containing a map and statistics describing the resulting clusters found by SaTScan.

BACKGROUND

SaTScan is a program often used for space-time cluster detection. In order to run SaTScan, the data must be in a pre-specified text format. Once the input files are in the correct format, the typical user opens SaTScan, chooses the appropriate options, and runs SaTScan. The output from SaTScan consists of one or more text files with statistical and geographical information about the clusters. Errors in SaTScan often require re-extraction of the data into the specified text format.

When running SaTScan many times per day, as is commonly done in surveillance, it can be cumbersome to create all of the necessary data sets and run SaTScan. This is also true for any kind of evaluation of systems that rely on SaTScan for surveillance. In addition, the lack of graphical output, such as a map of the areas identified in the cluster, detracts from the utility of otherwise excellent software.

METHODS

We wrote four SAS macros to help improve SaTScan for use in surveillance and evaluation. The macros also contain error checks to make sure that the appropriate data sets and variables exist, and include explicit error messages. The error checks cause SAS to stop if a required data set is missing, or if a required variable within a data set is missing. These errors are printed in the SAS log.

The first macro takes SAS data sets in a simple prescribed format and generates text files in SaTScan format: the files are a population or control file, a case file, and a coordinates file.

The second macro allows the user to choose the SaTScan analysis options and then runs SaTScan directly from within SAS. There are defaults for most SaTScan options.

The third macro reads the results from SaTScan and creates a graphical output page, based on a separate map boundary file. The output page includes a map of the cluster, key statistical information and a text list of the areas included.

The last macro incorporates the other 3 macros and allows the user make the required data sets, run SaTScan, and create the map all in one step.

RESULTS

Shown here is an example of the map generated from the SMAC package using reports of cryptosporidium from the Massachusetts Department of Public Health.

Study Period: 03/12/2002 to 09/09/2002
Cluster dates: 09/06/2002 to 09/09/2002 (4 days)
Centered in Wellesley, MA
Center= 02482 Radius= 5.44 km
Observed cases= 4 Expected cases= 0.02 P-value= 0.001



Zip codes in cluster:
01760 02462 02481 02482 02492 02494

CONCLUSIONS

For those with a little SAS knowledge, the SMAC package is an easy to use SAS interface which allows the user to run SaTScan from within SAS and create maps of the SaTScan cluster. Assuming the data reside in SAS or an easily imported format such as an EXCEL spreadsheet, the macros can save steps and time for applications in which SaTScan is run frequently. The SMAC package allows the user to easily create the needed data sets and run SaTScan within SAS, and provides graphical output of the clusters.

REFERENCES

[1] Kulldorff, M, *SaTScan: Software for the spatial and space-time scan statistics*. 2004, www.satscan.org.