

# TreeScan Version History

## SUMMARY

- 2011 **Version 1.0:** Poisson model, Bernoulli model
- 2014 **Version 1.1:** Tree-temporal scan statistic. Statistical power estimation. Data import wizard. Improved user interface.
- 2015 **Version 1.2:** Tree-temporal scan statistic adjusted for overall temporal pattern. Purely temporal scan statistic. Day of week adjustment.
- 2016 **Version 1.3:** Scan multiple trees and allowing for nodes with multiple parents. Statistical power estimation for the conditional Bernoulli, tree-temporal and purely temporal scan statistics.
- 2018 **Version 1.4:** Differential follow-up time.
- 2022 **Version 2.0:** Prospective analysis, Sequential Tree Scan Statistic, Bernoulli tree-time, Temporal graphs.
- 2022 **Version 2.1:** Whole tree visualizations.
- 2024 **Version 2.2:** Scan for high, low, and high or low cuts, early termination, ignore records outside data time range.
- 2025 **Version 2.3:** Variable case probability, nodes not evaluated.
- 2026 **Version 2.4:** Trend model, cut window visualization.

## DETAILS

### **Version 2.4, April 2026**

#### *New Analytical Features*

Introduced a trend probability model specifically designed to support genomic wastewater surveillance.

Added a new output file for tree-time and time-only scans that visualize windows of reported cuts.

#### *Other Improvements*

Updated temporal graph to allow limiting reported cuts by recurrence interval.

Updated temporal graph to implement global selection of series displayed in all rendered graphs.

Added option to specify a user specified title to be included in output files.

Implemented the data time range exclusions for Bernoulli time and uniform time models.

Added file wizard feature which allows import of one-count variable, useful with the tree file.

Updated HTML output file to order table sub-nodes by relative risk, direction matching cut rate.

Recurrence intervals partly reported with words when greater than one thousand years.

Updated graphical user interface to Java 25 LTS.

Updated compilation to the C++17 standard for the C++ programming language.

#### *Minor Fixes*

Correction for reported cuts when using the early termination option.

Updated header row of table in HTML output to now horizontally scrolls with table body.

Corrected HTML output table with sub-nodes when multiple nodes were defined in the tree file with the same name.

Correction to the temporal graph y-axis unit display.

Corrected reported observations in output for the variable Bernoulli without self-control design.

### **Version 2.3, January 2025**

#### *New Analytical Features*

Added a new tree-based scan statistic enhancement to the existing Bernoulli tree-based scan statistic that allows for a variable probability to be used (rather than a fixed, user-specified probability).

Added an alternative to skipping levels in tree with the 'Tree Levels' option. Now specific nodes in the tree can be marked as not evaluated through exact or wildcard naming in a new input file.

#### *Other Improvements*

For temporal graphs depicting detected clusters, it now reports the percentage of the cases in the cluster branch that are also in the temporal cluster window, while comparing that percentage to outside the cluster.

Updated table in main results output in HTML format to include child nodes which have cases on the node but not necessarily in cluster window.

Created a new section in main result files to detail path to user requested additional output files.

Global event probability for Bernoulli tree-based scan statistic can now be entered as a decimal value.

#### *Minor Fixes*

Corrected HTML/JavaScript in temporal graphical output to correct the inability to export. Improved text wrapping in the main output file in text format.

### **Version 2.2.1, May 2024**

#### *Minor Fixes*

Correction to the reported number of cases excluded from analysis when applying a data time range exclusion.

Correction to the translation from input date to date index when the specified time precision is less than that of a read case or control date.

#### *Other Improvements*

Summary statistics section now reports the number of nodes evaluated when restricting which tree levels are evaluated.

Summary statistics section now reports the number exposed, which is a user setting used in the attributable risk calculation.

The link to the temporal graph in HTML output file is now a clickable link.

### **Version 2.2, January 2024**

#### *New Analytical Features*

Added option to scan for high, low, and high or low cuts simultaneously.

Added option to ignore records in case/control files that are outside the data time range.

Added p-value option for early termination.

Added sequential tree scan statistic for unconditional and conditional Poisson.

#### *Other Improvements*

Added option that excludes parent cuts in analysis results which are identical to child cuts.

Added non-analytical option to specify the distance between tree nodes (default 1). The distance between nodes is used when displaying the Newick tree in output files.

Added non-analytical option which permits providing a descriptive name to tree nodes.

Improved temporal graphs file to allow for the selective display of cut graphs, which allows for faster loading time and better comparison.

The histograms of the temporal graphs now display as stacked verses overlapping.

Added tree verification option to allow/disallow multiple root nodes in the tree (default allow).

Added tree verification option to allow/disallow nodes with multiple parents (default disallow).

Added tree verification option to enforce data is on leaves of tree only (default enforce).

Added alternative file browsing option which can improve browsing time.

Revised file path resolution issue in parameter file on Windows.

Minor improvements to Linux rpm installer.

### *Minor Fixes*

Corrected the sorting behavior in the table of the HTML results file.

Corrected bug when the user specified an alternative randomization seed.

## **Version 2.1.1, November 2022**

### *Minor Fixes*

Correction in the reported expected, relative risk, excess cases and attributable risk for the temporal only or tree temporal scan with conditional Bernoulli.

## **Version 2.1, July 2022**

### *New Analytical Features*

Added ability to generate output files which can visualize entire tree along with analysis results.

## **Version 2.0, February 2022**

### *New Analytical Features*

Added prospective analysis option for tree-time/time-only scans.

Added Sequential tree scan statistic (Unconditional Bernoulli).

Added Bernoulli tree-time analysis.

Temporal graphs in HTML format, depicting the observed and expected counts over time, both inside and outside the cluster.

### *Other Improvements*

Ability to choose between generic date ranges and date-based ranges.

Added option to color tree visualization by recurrence interval.

Installation now bundles Java, so that it does not have to be pre-installed.

The GUI was revised to switch the order of the Input and Analysis tabs.

Added option to input control file separately from count file.

Added ability to restrict the minimum number of cases in scanned nodes.

Added 'Parent Node' column to results files.

### *Minor Fixes*

Self-referencing nodes in tree-file generate error.

File wizard correction when selecting 'First row is column header' while saving import settings (verse importing now).

Last generated results file no longer truncated when opening parameter file in GUI.

## **Version 1.4, June 2018**

### *New Analytical Features*

Differential follow-up time with temporal scan statistics.  
Multiple ranges in the data time range.  
Scanning risk window parameters.  
Tree visualization in html output file.

### *Minor Fixes*

Mac version updated to work with Oracle Java 9.

## **Version 1.3, August 2016**

### *New Analytical Features*

Scan multiple trees simultaneously.  
Allows for leaves and nodes with multiple parents.  
Statistical power estimation for the conditional Bernoulli model.  
Statistical power estimation for the tree-temporal scan statistic.  
Statistical power estimation for the purely temporal scan statistic.  
Ability to restrict the scanning to only certain pre-specified levels of the tree.

### *Minor Fixes*

Correction in import wizard that causes memory leak when importing file.  
Correction to command-line override of randomization seed.

## **Version 1.2, November 2015**

### *New Analytical Features*

Tree-temporal scan statistic, conditioned on node and time, to adjust for overall temporal pattern.  
Purely temporal scan statistic.  
Adjustments for day of week and node-by-day of week interaction.  
Calculation of attributable risk.

### *Other Improvements*

Improved import wizard.  
New example data sets.  
Relative risk reported for all scan types, replacing observed divided by expected.  
Tree structure attributes reported in the data summary.

## **Version 1.1.2, March 2015**

### *Minor Fixes*

Correction to v1.1.1 random data generation for unconditional Poisson power estimation.

## **Version 1.1.1, March 2015**

### *Improvements*

Statistical power estimates reported to a tabular file.

### *Minor Fixes*

Correction to log likelihood tie-breaking mechanism when calculating p-values.  
Correction to random data generation for conditional Poisson power estimation.

## **Version 1.1, November 2014**

### *New Analytical Features*

Tree-temporal scan statistic.  
Statistical power estimation.

### *Other Improvements*

Data import wizard  
Advanced graphical user interface options  
Application update feature  
Improved command-line options  
Improved user interface  
TreeScan user guide in .pdf format  
New TreeScan logo and icon

## **Version 1.0, 2011**

### *Analytical Features*

Poisson model  
Bernoulli model  
Simple, pairs, triples and ordinal cuts, defined by a cut type file

### *Other Improvements*

Separate case and tree input files  
Graphical user interface  
HTML results file  
Comma separated value (CSV) results data file  
Parallelized simulations