Temporal Kernel Density

Title Temporal Kernel Density

Description

This geogrocessing script is intended to do batch kernel densities on a feature class based on tool determined time bins. Each bin will be a kernel density raster in a final moasic dataset.

Usage

This tool is used to visualize temporal data by splitting a feature class into time bins with make feature layer and then running a kernel density tool on each time bin. After this tool is run mosaic datasets can be used to create animations of change over time.

Syntax

TemporalKernelDensity (Input_Feature_Class, Output_Workspace, Output_Time_Table_Name, Start_Time_or_Single_Time_Field, {End_Time}, Time_Interval, {Bin_Start}, {Population_Field}, Cell_Size, Search_Radius, Area_Scale_Unit_Factor, Out_Cell_Values, Compact_Workspace)

Parameter	Explanation	Data Type
Input_Feature_Class	Dialog Reference Is the input feature class or table that will be split based on a datetime field. Python Reference Uses Python deltatime and datetime libraries.	Feature Class
Output_Workspace	Dialog Reference The output workspace such as a file geodatabase, that will receive the new moasic dataset of kernel densities split based on a date field. It is best to use a brand new FGDB. There is no python reference for this parameter.	Workspace
Output_Time_Table_Name	Dialog Reference This is the name of the output table that is built to create the temporal relationship between the output kernel densities and the mosaic footprint. There is no python reference for this parameter.	String
Start_Time_or_Single_Time_Field	Dialog Reference Either the single datetime field or a start field that will be used with an endtime to extract all datetime values that are within the range of the created timebins. There is no python reference for this parameter.	Field

End_Time (Optional)	Dialog Reference This optional field is only used with specific datasets that have an end time field. If there is not end time field chosen, only start time will be used to both construct the time ranges and the final end time. Python Reference **if** FieldExist(*inFeatureClass*, *end_time*) **and** *end_time***:arcPrint("Using start and end time to grab feature classes whose bins occur within an events ""start or end time.")end_time_min, end_time_max = get_min_max_from_field (*inFeatureClass*, *end_time*)start_time_field = *start_timeend_time_field* = *end_timestart_time_range* = *start_time_minend_time_range* = *end_time_maxelse:arcPrint("Using only first datetime start field to construct time bin ranges.") start_time_field = start_timeend_time_field = start_timestart_time_range = start_time_minend_time_range = start_time_max*	Field
Time_Interval	Dialog Reference The number of seconds, minutes, hours, days, weeks, or years that will represent a single time step. Examples of valid entries for this parameter are 1 Day, 12 Hours, 30 Seconds, or 1 Minute. Units greater than weeks will break the tool, if you need years, put it into day or week equivalents. Python Reference **@arcToolReportdef construct_time_bin_ranges** (*first_time*, *last_time*, *time_delta*)**:temporal_counter = *first_timetotal_time_range = last_time - first_timebin_count = int(np.ceil (total_time_range.total_seconds() / time_delta.total_seconds()))nested_time_bin_pairs = []for bin in range(bin_count):start_time = temporal_counterend_time = temporal_counter + time_deltanested_time_bin_pairs.append ([start_time, end_time])temporal_counter = end_timereturn nested_time_bin_pairs*	Time unit
Bin_Start (Optional)	Dialog Reference This is the time you want the binning process to start from. If you place a datetime here, it will replace the minimum time value of the start time field you selected as the bin start time.	Date

	For example selecting 1990/1/1 12:00:00 AM would start the binning interval at that time period rather than a minimum calculated by the script. There is no python reference for this parameter.	
Population_Field (Optional)	Dialog Reference Values in the population field may be integer or floating point. The options and default behaviors for the field are listed below. Use None if no item or special value will be used and each feature will be counted once. You can use Shape if input features contains Z. Otherwise, the default field is POPULATION. The following conditions may also apply. If there is no POPULATION field, but there is a POPULATIONxxxx field, this is used by default. The xxxx can be any valid character, such as POPULATION6, POPULATION1974, or POPULATIONROADTYPE. If there is no POPULATION field or POPULATIONxxxx field, but there is a POP field, this is used by default. If there is no POPULATION field, POPULATIONxxxx field, or POP field, but there is a POPxxxx field, this is used by default. If there is no POPULATION field, POPULATIONxxxx field, POP field, or POPxxxx field, NONE is used by default. There is no python reference for this parameter.	Field
Cell_Size	Dialog Reference The cell size for the output raster dataset. This is the value in the environment if specifically set. If the environment is not set, then cell size is the shorter of the width or height of the output extent in the output spatial reference, divided by 250. There is no python reference for this parameter.	Long
Search_Radius	Dialog Reference The search radius within which to calculate density. Units are based on the linear unit of the projection of the output spatial reference. For example, if the units are in meters—to include all features within a one-mile neighborhood—set the search radius equal to 1609.344 (1 mile = 1609.344 meters).	Double

	There is no python reference for this parameter.	
Area_Scale_Unit_Factor	Dialog Reference The desired area units of the output density values. A default unit is selected based on the linear unit of the output spatial reference. You can change this to the appropriate unit if you wish to convert the density output. Values for line density convert the units of both length and area. If no output spatial reference is specified, the output spatial reference will be the same as the input feature class. The default output density units is determined by the linear units of the output spatial reference as follows. If the output linear units are meters, the output area density units will be set to SQUARE_KILOMETERS, outputting square kilometers for point features or kilometers per square kilometers for polyline features. If the output linear units are feet, the output area density units will be set to SQUARE_MILES. If the output units is anything other than feet or meters, the output area density units will be set to SQUARE_MAP_UNITS. That is, the output density units will be the square of the linear units of the output spatial reference. For example, if the output linear units is centimeters, the output area density units will be SQUARE_MAP_UNITS, which would result in square centimeters. If the output linear units is kilometers, the output area density units will be SQUARE_MAP_UNITS, which would result in square kilometers. The available options and their corresponding output density units are the following: SQUARE_MAP_UNITS — For the square of the linear units of the output spatial reference. SQUARE_MILES — For miles (U.S.). SQUARE_KILOMETERS — For kilometers. ACRES —For acres (U.S.). HECTARES —For hectares. SQUARE_YARDS —For yards (U.S.). SQUARE_FEET —For feet (U.S.). SQUARE_INCHES — For inches (U.S.). SQUARE_METERS —For meters. SQUARE_CENTIMETERS — For centimeters. SQUARE_MILLIMETERS — For millimeters.	String

	There is no python reference for this parameter.	
Out_Cell_Values	Dialog Reference Determines what the values in the output raster represent. DENSITIES —The output values represent the predicted density value. This is the default. EXPECTED_COUNTS —The output values represent the predicted amount of the phenomenon within each cell.Since the cell value is linked to the specified cell size, the resulting raster cannot be resampled to a different cell size and still represent the amount of the phenomenon. There is no python reference for this parameter.	String
Compact_Workspace	Dialog Reference Optionally will compact the workspace after the tool runs. Will skip on a workspace you can't compact. There is no python reference for this parameter.	Boolean

Code Samples

There are no code samples for this tool.

Tags

Time, raster, kernel density, FGDB, time bins, animation

Credits

David Wasserman

Use limitations

There are no access and use limitations for this item.

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