Package 'apache.sedona'

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Type Package

Title R Interface for Apache Sedona

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Description R interface for 'Apache Sedona' based on 'sparklyr' (<https://sedona.apache.org>).

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URL https://github.com/apache/sedona/, https://sedona.apache.org/

BugReports https://github.com/apache/sedona/issues

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Contents

`approx_count` *Find the approximate total number of records within a Spatial RDD.*

Description

Given a Sedona spatial RDD, find the (possibly approximated) number of total records within it.

Usage

```
approx_count(x)
```

Arguments

`x`	A Sedona spatial RDD.

Value

Approximate number of records within the SpatialRDD.

See Also

Other Spatial RDD aggregation routine: `minimum_bounding_box()`

Examples

```
library(sparklyr)
library(apache.sedona)

sc <- spark_connect(master = "spark://HOST:PORT")

if (!inherits(sc, "test_connection")) {
  input_location <- "/dev/null" # replace it with the path to your input file
  rdd <- sedona_read_shapefile_to_typed_rdd(
    sc,
    location = input_location, type = "polygon"
  )
  approx_cnt <- approx_count(rdd)
}
```

`crs_transform` *Perform a CRS transformation.*

Description

Transform data within a spatial RDD from one coordinate reference system to another. This uses the lon/lat order since v1.5.0. Before, it used lat/lon

Usage

```
crs_transform(x, src_epsg_crs_code, dst_epsg_crs_code, strict = FALSE)
```

Arguments

`x`	The spatial RDD to be processed.
`src_epsg_crs_code`	Coordinate reference system to transform from (e.g., "epsg:4326", "epsg:3857", etc).
`dst_epsg_crs_code`	Coordinate reference system to transform to. (e.g., "epsg:4326", "epsg:3857", etc).
`strict`	If FALSE (default), then ignore the "Bursa-Wolf Parameters Required" error.

Value

The transformed SpatialRDD.

Examples

```
library(sparklyr)
library(apache.sedona)

sc <- spark_connect(master = "spark://HOST:PORT")

if (!inherits(sc, "test_connection")) {
  input_location <- "/dev/null" # replace it with the path to your input file
  rdd <- sedona_read_geojson_to_typed_rdd(
    sc,
    location = input_location, type = "polygon"
  )
  crs_transform(
    rdd,
    src_epsg_crs_code = "epsg:4326", dst_epsg_crs_code = "epsg:3857"
  )
}
```

---

minimum_bounding_box *Find the minimal bounding box of a geometry.*

Description

Given a Sedona spatial RDD, find the axis-aligned minimal bounding box of the geometry represented by the RDD.

Usage

```
minimum_bounding_box(x)
```

Arguments

x	A Sedona spatial RDD.

Value

A minimum bounding box object.

See Also

Other Spatial RDD aggregation routine: approx_count()

Examples

```
library(sparklyr)
library(apache.sedona)

sc <- spark_connect(master = "spark://HOST:PORT")

if (!inherits(sc, "test_connection")) {
  input_location <- "/dev/null" # replace it with the path to your input file
  rdd <- sedona_read_shapefile_to_typed_rdd(
    sc,
    location = input_location, type = "polygon"
  )
  boundary <- minimum_bounding_box(rdd)
}
```

---

new_bounding_box *Construct a bounding box object.*

Description

Construct a axis-aligned rectangular bounding box object.

Usage

```
new_bounding_box(sc, min_x = -Inf, max_x = Inf, min_y = -Inf, max_y = Inf)
```

Arguments

sc	The Spark connection.
min_x	Minimum x-value of the bounding box, can be +/- Inf.
max_x	Maximum x-value of the bounding box, can be +/- Inf.
min_y	Minimum y-value of the bounding box, can be +/- Inf.
max_y	Maximum y-value of the bounding box, can be +/- Inf.

Value

A bounding box object.

Examples

```
library(sparklyr)
library(apache.sedona)

sc <- spark_connect(master = "spark://HOST:PORT")
bb <- new_bounding_box(sc, -1, 1, -1, 1)
```

`sdf_register.spatial_rdd` *Import data from a spatial RDD into a Spark Dataframe.*

Description

Import data from a spatial RDD (possibly with non-spatial attributes) into a Spark Dataframe.

- `sdf_register`: method for sparklyr's sdf_register to handle Spatial RDD
- `as.spark.dataframe`: lower level function with more fine-grained control on non-spatial columns

Usage

```
## S3 method for class 'spatial_rdd'
sdf_register(x, name = NULL)

as.spark.dataframe(x, non_spatial_cols = NULL, name = NULL)
```

Arguments

`x`	A spatial RDD.
`name`	Name to assign to the resulting Spark temporary view. If unspecified, then a random name will be assigned.
`non_spatial_cols`	Column names for non-spatial attributes in the resulting Spark Dataframe. By default (NULL) it will import all field names if that property exists, in particular for shapefiles.

Value

A Spark Dataframe containing the imported spatial data.

Examples

```
library(sparklyr)
library(apache.sedona)

sc <- spark_connect(master = "spark://HOST:PORT")

if (!inherits(sc, "test_connection")) {
  input_location <- "/dev/null" # replace it with the path to your input file
  rdd <- sedona_read_geojson_to_typed_rdd(
    sc,
    location = input_location,
    type = "polygon"
  )
  sdf <- sdf_register(rdd)
```

```
  input_location <- "/dev/null" # replace it with the path to your input file
  rdd <- sedona_read_dsv_to_typed_rdd(
    sc,
    location = input_location,
    delimiter = ",",
    type = "point",
    first_spatial_col_index = 1L,
    repartition = 5
  )
  sdf <- as.spark.dataframe(rdd, non_spatial_cols = c("attr1", "attr2"))
}
```

`sedona_apply_spatial_partitioner` *Apply a spatial partitioner to a Sedona spatial RDD.*

Description

Given a Sedona spatial RDD, partition its content using a spatial partitioner.

Usage

```
sedona_apply_spatial_partitioner(
  rdd,
  partitioner = c("quadtree", "kdbtree"),
  max_levels = NULL
)
```

Arguments

`rdd`	The spatial RDD to be partitioned.
`partitioner`	The name of a grid type to use (currently "quadtree" and "kdbtree" are supported) or an `org.apache.sedona.core.spatialPartitioning.SpatialPartitioner` JVM object. The latter option is only relevant for advanced use cases involving a custom spatial partitioner.
`max_levels`	Maximum number of levels in the partitioning tree data structure. If NULL (default), then use the current number of partitions within `rdd` as maximum number of levels. Specifying `max_levels` is unsupported for use cases involving a custom spatial partitioner because in these scenarios the partitioner object already has its own maximum number of levels set and there is no well-defined way to override this existing setting in the partitioning data structure.

Value

A spatially partitioned SpatialRDD.

Examples

```
library(sparklyr)
library(apache.sedona)

sc <- spark_connect(master = "spark://HOST:PORT")

if (!inherits(sc, "test_connection")) {
  input_location <- "/dev/null" # replace it with the path to your input file
  rdd <- sedona_read_dsv_to_typed_rdd(
    sc,
    location = input_location,
    delimiter = ",",
    type = "point",
    first_spatial_col_index = 1L
  )
  sedona_apply_spatial_partitioner(rdd, partitioner = "kdbtree")
}
```

---

sedona_build_index *Build an index on a Sedona spatial RDD.*

Description

Given a Sedona spatial RDD, build the type of index specified on each of its partition(s).

Usage

```
sedona_build_index(
  rdd,
  type = c("quadtree", "rtree"),
  index_spatial_partitions = TRUE
)
```

Arguments

rdd	The spatial RDD to be indexed.
type	The type of index to build. Currently "quadtree" and "rtree" are supported.
index_spatial_partitions	If the RDD is already partitioned using a spatial partitioner, then index each spatial partition within the RDD instead of partitions within the raw RDD associated with the underlying spatial data source. Default: TRUE. Notice this option is irrelevant if the input RDD has not been partitioned using with a spatial partitioner yet.

Value

A spatial index object.

Examples

```
library(sparklyr)
library(apache.sedona)

sc <- spark_connect(master = "spark://HOST:PORT")

if (!inherits(sc, "test_connection")) {
  input_location <- "/dev/null" # replace it with the path to your input file
  rdd <- sedona_read_shapefile_to_typed_rdd(
    sc,
    location = input_location,
    type = "polygon"
  )
  sedona_build_index(rdd, type = "rtree")
}
```

---

sedona_knn_query *Query the k nearest spatial objects.*

Description

Given a spatial RDD, a query object x, and an integer k, find the k nearest spatial objects within the RDD from x (distance between x and another geometrical object will be measured by the minimum possible length of any line segment connecting those 2 objects).

Usage

```
sedona_knn_query(
  rdd,
  x,
  k,
  index_type = c("quadtree", "rtree"),
  result_type = c("rdd", "sdf", "raw")
)
```

Arguments

rdd	A Sedona spatial RDD.
x	The query object.
k	Number of nearest spatail objects to return.
index_type	Index to use to facilitate the KNN query. If NULL, then do not build any additional spatial index on top of x. Supported index types are "quadtree" and "rtree".

`result_type` Type of result to return. If "rdd" (default), then the k nearest objects will be returned in a Sedona spatial RDD. If "sdf", then a Spark dataframe containing the k nearest objects will be returned. If "raw", then a list of k nearest objects will be returned. Each element within this list will be a JVM object of type `org.locationtech.jts.geom.Geometry`.

Value

The KNN query result.

See Also

Other Sedona spatial query: `sedona_range_query()`

Examples

```
library(sparklyr)
library(apache.sedona)

sc <- spark_connect(master = "spark://HOST:PORT")

if (!inherits(sc, "test_connection")) {
  knn_query_pt_x <- -84.01
  knn_query_pt_y <- 34.01
  knn_query_pt_tbl <- sdf_sql(
    sc,
    sprintf(
      "SELECT ST_GeomFromText(\"POINT(%f %f)\") AS `pt`",
      knn_query_pt_x,
      knn_query_pt_y
    )
  ) %>%
     collect()
  knn_query_pt <- knn_query_pt_tbl$pt[[1]]
  input_location <- "/dev/null" # replace it with the path to your input file
  rdd <- sedona_read_geojson_to_typed_rdd(
    sc,
    location = input_location,
    type = "polygon"
  )
  knn_result_sdf <- sedona_knn_query(
    rdd,
    x = knn_query_pt, k = 3, index_type = "rtree", result_type = "sdf"
  )
}
```

sedona_range_query *Execute a range query.*

Description

Given a spatial RDD and a query object x, find all spatial objects within the RDD that are covered by x or intersect x.

Usage

```
sedona_range_query(
  rdd,
  x,
  query_type = c("cover", "intersect"),
  index_type = c("quadtree", "rtree"),
  result_type = c("rdd", "sdf", "raw")
)
```

Arguments

rdd	A Sedona spatial RDD.
x	The query object.
query_type	Type of spatial relationship involved in the query. Currently "cover" and "intersect" are supported.
index_type	Index to use to facilitate the KNN query. If NULL, then do not build any additional spatial index on top of x. Supported index types are "quadtree" and "rtree".
result_type	Type of result to return. If "rdd" (default), then the k nearest objects will be returned in a Sedona spatial RDD. If "sdf", then a Spark dataframe containing the k nearest objects will be returned. If "raw", then a list of k nearest objects will be returned. Each element within this list will be a JVM object of type org.locationtech.jts.geom.Geometry.

Value

The range query result.

See Also

Other Sedona spatial query: sedona_knn_query()

Examples

```
library(sparklyr)
library(apache.sedona)

sc <- spark_connect(master = "spark://HOST:PORT")
```

```
if (!inherits(sc, "test_connection")) {
  range_query_min_x <- -87
  range_query_max_x <- -50
  range_query_min_y <- 34
  range_query_max_y <- 54
  geom_factory <- invoke_new(
    sc,
    "org.locationtech.jts.geom.GeometryFactory"
  )
  range_query_polygon <- invoke_new(
    sc,
    "org.locationtech.jts.geom.Envelope",
    range_query_min_x,
    range_query_max_x,
    range_query_min_y,
    range_query_max_y
  ) %>%
    invoke(geom_factory, "toGeometry", .)
  input_location <- "/dev/null" # replace it with the path to your input file
  rdd <- sedona_read_geojson_to_typed_rdd(
    sc,
    location = input_location,
    type = "polygon"
  )
  range_query_result_sdf <- sedona_range_query(
    rdd,
    x = range_query_polygon,
    query_type = "intersect",
    index_type = "rtree",
    result_type = "sdf"
  )
}
```

`sedona_read_dsv_to_typed_rdd` *Create a typed SpatialRDD from a delimiter-separated values data source.*

Description

Create a typed SpatialRDD (namely, a PointRDD, a PolygonRDD, or a LineStringRDD) from a data source containing delimiter-separated values. The data source can contain spatial attributes (e.g., longitude and latidude) and other attributes. Currently only inputs with spatial attributes occupying a contiguous range of columns (i.e., [first_spatial_col_index, last_spatial_col_index]) are supported.

Usage

```
sedona_read_dsv_to_typed_rdd(
```

```
  sc,
  location,
  delimiter = c(",", "\t", "?", "'", "\"", "_", "-", "%", "~", "|", ";"),
  type = c("point", "polygon", "linestring"),
  first_spatial_col_index = 0L,
  last_spatial_col_index = NULL,
  has_non_spatial_attrs = TRUE,
  storage_level = "MEMORY_ONLY",
  repartition = 1L
)
```

Arguments

sc	A spark_connection.
location	Location of the data source.
delimiter	Delimiter within each record. Must be one of ',', '\t', '?', '\', '"', '_', '-', '%', '~', '|', ';'
type	Type of the SpatialRDD (must be one of "point", "polygon", or "linestring".
first_spatial_col_index	Zero-based index of the left-most column containing spatial attributes (default: 0).
last_spatial_col_index	Zero-based index of the right-most column containing spatial attributes (default: NULL). Note last_spatial_col_index does not need to be specified when creating a PointRDD because it will automatically have the implied value of (first_spatial_col_index + 1). For all other types of RDDs, if last_spatial_col_index is unspecified, then it will assume the value of -1 (i.e., the last of all input columns).
has_non_spatial_attrs	Whether the input contains non-spatial attributes.
storage_level	Storage level of the RDD (default: MEMORY_ONLY).
repartition	The minimum number of partitions to have in the resulting RDD (default: 1).

Value

A typed SpatialRDD.

See Also

Other Sedona RDD data interface functions: sedona_read_geojson(), sedona_read_shapefile_to_typed_rdd(), sedona_save_spatial_rdd(), sedona_write_wkb()

Examples

```
library(sparklyr)
library(apache.sedona)

sc <- spark_connect(master = "spark://HOST:PORT")
```

```
if (!inherits(sc, "test_connection")) {
  input_location <- "/dev/null" # replace it with the path to your csv file
  rdd <- sedona_read_dsv_to_typed_rdd(
    sc,
    location = input_location,
    delimiter = ",",
    type = "point",
    first_spatial_col_index = 1L
  )
}
```

---

sedona_read_geojson *Read geospatial data into a Spatial RDD*

Description

Import spatial object from an external data source into a Sedona SpatialRDD.

- sedona_read_shapefile: from a shapefile
- sedona_read_geojson: from a geojson file
- sedona_read_wkt: from a geojson file
- sedona_read_wkb: from a geojson file

Usage

```
sedona_read_geojson(
  sc,
  location,
  allow_invalid_geometries = TRUE,
  skip_syntactically_invalid_geometries = TRUE,
  storage_level = "MEMORY_ONLY",
  repartition = 1L
)

sedona_read_wkb(
  sc,
  location,
  wkb_col_idx = 0L,
  allow_invalid_geometries = TRUE,
  skip_syntactically_invalid_geometries = TRUE,
  storage_level = "MEMORY_ONLY",
  repartition = 1L
)

sedona_read_wkt(
```

```
  sc,
  location,
  wkt_col_idx = 0L,
  allow_invalid_geometries = TRUE,
  skip_syntactically_invalid_geometries = TRUE,
  storage_level = "MEMORY_ONLY",
  repartition = 1L
)

sedona_read_shapefile(sc, location, storage_level = "MEMORY_ONLY")
```

Arguments

sc	A spark_connection.
location	Location of the data source.
allow_invalid_geometries	Whether to allow topology-invalid geometries to exist in the resulting RDD.
skip_syntactically_invalid_geometries	Whether to allows Sedona to automatically skip syntax-invalid geometries, rather than throwing errorings.
storage_level	Storage level of the RDD (default: MEMORY_ONLY).
repartition	The minimum number of partitions to have in the resulting RDD (default: 1).
wkb_col_idx	Zero-based index of column containing hex-encoded WKB data (default: 0).
wkt_col_idx	Zero-based index of column containing hex-encoded WKB data (default: 0).

Value

A SpatialRDD.

See Also

Other Sedona RDD data interface functions: sedona_read_dsv_to_typed_rdd(), sedona_read_shapefile_to_typed_rd
sedona_save_spatial_rdd(), sedona_write_wkb()

Examples

```
library(sparklyr)
library(apache.sedona)

sc <- spark_connect(master = "spark://HOST:PORT")

if (!inherits(sc, "test_connection")) {
  input_location <- "/dev/null" # replace it with the path to your input file
  rdd <- sedona_read_geojson(sc, location = input_location)
}
```

sedona_read_shapefile_to_typed_rdd *(Deprecated) Create a typed SpatialRDD from a shapefile or geojson data source.*

Description

[Deprecated]

Constructors of typed RDD (PointRDD, PolygonRDD, LineStringRDD) are soft deprecated, use non-types versions

Create a typed SpatialRDD (namely, a PointRDD, a PolygonRDD, or a LineStringRDD)

- `sedona_read_shapefile_to_typed_rdd`: from a shapefile data source
- `sedona_read_geojson_to_typed_rdd`: from a GeoJSON data source

Usage

```
sedona_read_shapefile_to_typed_rdd(
  sc,
  location,
  type = c("point", "polygon", "linestring"),
  storage_level = "MEMORY_ONLY"
)

sedona_read_geojson_to_typed_rdd(
  sc,
  location,
  type = c("point", "polygon", "linestring"),
  has_non_spatial_attrs = TRUE,
  storage_level = "MEMORY_ONLY",
  repartition = 1L
)
```

Arguments

`sc`	A `spark_connection`.
`location`	Location of the data source.
`type`	Type of the SpatialRDD (must be one of "point", "polygon", or "linestring".
`storage_level`	Storage level of the RDD (default: MEMORY_ONLY).
`has_non_spatial_attrs`	Whether the input contains non-spatial attributes.
`repartition`	The minimum number of partitions to have in the resulting RDD (default: 1).

Value

A typed SpatialRDD.

See Also

Other Sedona RDD data interface functions: sedona_read_dsv_to_typed_rdd(), sedona_read_geojson(), sedona_save_spatial_rdd(), sedona_write_wkb()

Examples

```
library(sparklyr)
library(apache.sedona)

sc <- spark_connect(master = "spark://HOST:PORT")

if (!inherits(sc, "test_connection")) {
  input_location <- "/dev/null" # replace it with the path to your shapefile
  rdd <- sedona_read_shapefile_to_typed_rdd(
    sc,
    location = input_location, type = "polygon"
  )
}
```

---

sedona_render_choropleth_map

Visualize a Sedona spatial RDD using a choropleth map.

Description

Generate a choropleth map of a pair RDD assigning integral values to polygons.

Usage

```
sedona_render_choropleth_map(
  pair_rdd,
  resolution_x,
  resolution_y,
  output_location,
  output_format = c("png", "gif", "svg"),
  boundary = NULL,
  color_of_variation = c("red", "green", "blue"),
  base_color = c(0, 0, 0),
  shade = TRUE,
  reverse_coords = FALSE,
  overlay = NULL,
  browse = interactive()
)
```

Arguments

pair_rdd	A pair RDD with Sedona Polygon objects being keys and java.lang.Long being values.
resolution_x	Resolution on the x-axis.
resolution_y	Resolution on the y-axis.
output_location	Location of the output image. This should be the desired path of the image file excluding extension in its file name.
output_format	File format of the output image. Currently "png", "gif", and "svg" formats are supported (default: "png").
boundary	Only render data within the given rectangular boundary. The boundary parameter can be set to either a numeric vector of c(min_x, max_y, min_y, max_y) values, or with a bounding box object e.g., new_bounding_box(sc, min_x, max_y, min_y, max_y), or NULL (the default). If boundary is NULL, then the minimum bounding box of the input spatial RDD will be computed and used as boundary for rendering.
color_of_variation	Which color channel will vary depending on values of data points. Must be one of "red", "green", or "blue". Default: red.
base_color	Color of any data point with value 0. Must be a numeric vector of length 3 specifying values for red, green, and blue channels. Default: c(0, 0, 0).
shade	Whether data point with larger magnitude will be displayed with darker color. Default: TRUE.
reverse_coords	Whether to reverse spatial coordinates in the plot (default: FALSE).
overlay	A viz_op object containing a raster image to be displayed on top of the resulting image.
browse	Whether to open the rendered image in a browser (default: interactive()).

Value

No return value.

See Also

Other Sedona visualization routines: sedona_render_heatmap(), sedona_render_scatter_plot()

Examples

```
library(sparklyr)
library(apache.sedona)

sc <- spark_connect(master = "spark://HOST:PORT")

if (!inherits(sc, "test_connection")) {
  pt_input_location <- "/dev/null" # replace it with the path to your input file
  pt_rdd <- sedona_read_dsv_to_typed_rdd(
```

```
  sc,
  location = pt_input_location,
  type = "point",
  first_spatial_col_index = 1
)
polygon_input_location <- "/dev/null" # replace it with the path to your input file
polygon_rdd <- sedona_read_geojson_to_typed_rdd(
  sc,
  location = polygon_input_location,
  type = "polygon"
)
join_result_rdd <- sedona_spatial_join_count_by_key(
  pt_rdd,
  polygon_rdd,
  join_type = "intersect",
  partitioner = "quadtree"
)
sedona_render_choropleth_map(
  join_result_rdd,
  400,
  200,
  output_location = tempfile("choropleth-map-"),
  boundary = c(-86.8, -86.6, 33.4, 33.6),
  base_color = c(255, 255, 255)
)
}
```

`sedona_render_heatmap` *Visualize a Sedona spatial RDD using a heatmap.*

Description

Generate a heatmap of geometrical object(s) within a Sedona spatial RDD.

Usage

```
sedona_render_heatmap(
  rdd,
  resolution_x,
  resolution_y,
  output_location,
  output_format = c("png", "gif", "svg"),
  boundary = NULL,
  blur_radius = 10L,
  overlay = NULL,
  browse = interactive()
)
```

Arguments

rdd	A Sedona spatial RDD.
resolution_x	Resolution on the x-axis.
resolution_y	Resolution on the y-axis.
output_location	Location of the output image. This should be the desired path of the image file excluding extension in its file name.
output_format	File format of the output image. Currently "png", "gif", and "svg" formats are supported (default: "png").
boundary	Only render data within the given rectangular boundary. The boundary parameter can be set to either a numeric vector of c(min_x, max_y, min_y, max_y) values, or with a bounding box object e.g., new_bounding_box(sc, min_x, max_y, min_y, max_y), or NULL (the default). If boundary is NULL, then the minimum bounding box of the input spatial RDD will be computed and used as boundary for rendering.
blur_radius	Controls the radius of a Gaussian blur in the resulting heatmap.
overlay	A viz_op object containing a raster image to be displayed on top of the resulting image.
browse	Whether to open the rendered image in a browser (default: interactive()).

Value

No return value.

See Also

Other Sedona visualization routines: sedona_render_choropleth_map(), sedona_render_scatter_plot()

Examples

```
library(sparklyr)
library(apache.sedona)

sc <- spark_connect(master = "spark://HOST:PORT")

if (!inherits(sc, "test_connection")) {
  input_location <- "/dev/null" # replace it with the path to your input file
  rdd <- sedona_read_dsv_to_typed_rdd(
    sc,
    location = input_location,
    type = "point"
  )

  sedona_render_heatmap(
    rdd,
    resolution_x = 800,
    resolution_y = 600,
    output_location = tempfile("points-"),
```

```
    output_format = "png",
    boundary = c(-91, -84, 30, 35),
    blur_radius = 10
  )
}
```

`sedona_render_scatter_plot` *Visualize a Sedona spatial RDD using a scatter plot.*

Description

Generate a scatter plot of geometrical object(s) within a Sedona spatial RDD.

Usage

```
sedona_render_scatter_plot(
  rdd,
  resolution_x,
  resolution_y,
  output_location,
  output_format = c("png", "gif", "svg"),
  boundary = NULL,
  color_of_variation = c("red", "green", "blue"),
  base_color = c(0, 0, 0),
  shade = TRUE,
  reverse_coords = FALSE,
  overlay = NULL,
  browse = interactive()
)
```

Arguments

`rdd`	A Sedona spatial RDD.
`resolution_x`	Resolution on the x-axis.
`resolution_y`	Resolution on the y-axis.
`output_location`	Location of the output image. This should be the desired path of the image file excluding extension in its file name.
`output_format`	File format of the output image. Currently "png", "gif", and "svg" formats are supported (default: "png").
`boundary`	Only render data within the given rectangular boundary. The `boundary` parameter can be set to either a numeric vector of c(min_x, max_y, min_y, max_y) values, or with a bounding box object e.g., new_bounding_box(sc, min_x, max_y, min_y, max_y), or NULL (the default). If `boundary` is NULL, then the minimum bounding box of the input spatial RDD will be computed and used as boundary for rendering.

`color_of_variation`
: Which color channel will vary depending on values of data points. Must be one of "red", "green", or "blue". Default: red.

`base_color`
: Color of any data point with value 0. Must be a numeric vector of length 3 specifying values for red, green, and blue channels. Default: c(0, 0, 0).

`shade`
: Whether data point with larger magnitude will be displayed with darker color. Default: TRUE.

`reverse_coords`
: Whether to reverse spatial coordinates in the plot (default: FALSE).

`overlay`
: A `viz_op` object containing a raster image to be displayed on top of the resulting image.

`browse`
: Whether to open the rendered image in a browser (default: interactive()).

Value

No return value.

See Also

Other Sedona visualization routines: `sedona_render_choropleth_map()`, `sedona_render_heatmap()`

Examples

```
library(sparklyr)
library(apache.sedona)

sc <- spark_connect(master = "spark://HOST:PORT")

if (!inherits(sc, "test_connection")) {
  input_location <- "/dev/null" # replace it with the path to your input file
  rdd <- sedona_read_dsv_to_typed_rdd(
    sc,
    location = input_location,
    type = "point"
  )

  sedona_render_scatter_plot(
    rdd,
    resolution_x = 800,
    resolution_y = 600,
    output_location = tempfile("points-"),
    output_format = "png",
    boundary = c(-91, -84, 30, 35)
  )
}
```

sedona_save_spatial_rdd *Save a Spark dataframe containing exactly 1 spatial column into a file.*

Description

Export serialized data from a Spark dataframe containing exactly 1 spatial column into a file.

Usage

```
sedona_save_spatial_rdd(
  x,
  spatial_col,
  output_location,
  output_format = c("wkb", "wkt", "geojson")
)
```

Arguments

x	A Spark dataframe object in sparklyr or a dplyr expression representing a Spark SQL query.
spatial_col	The name of the spatial column.
output_location	Location of the output file.
output_format	Format of the output.

Value

No return value.

See Also

Other Sedona RDD data interface functions: sedona_read_dsv_to_typed_rdd(), sedona_read_geojson(), sedona_read_shapefile_to_typed_rdd(), sedona_write_wkb()

Examples

```
library(sparklyr)
library(apache.sedona)

sc <- spark_connect(master = "spark://HOST:PORT")

if (!inherits(sc, "test_connection")) {
  tbl <- dplyr::tbl(
    sc,
    dplyr::sql("SELECT ST_GeomFromText('POINT(-71.064544 42.28787)') AS `pt`")
  )
  sedona_save_spatial_rdd(
```

```
    tbl %>% dplyr::mutate(id = 1),
    spatial_col = "pt",
    output_location = "/tmp/pts.wkb",
    output_format = "wkb"
  )
}
```

`sedona_spatial_join` *Perform a spatial join operation on two Sedona spatial RDDs.*

Description

Given `spatial_rdd` and `query_window_rdd`, return a pair RDD containing all pairs of geometrical elements (p, q) such that p is an element of `spatial_rdd`, q is an element of `query_window_rdd`, and (p, q) satisfies the spatial relation specified by `join_type`.

Usage

```
sedona_spatial_join(
  spatial_rdd,
  query_window_rdd,
  join_type = c("contain", "intersect"),
  partitioner = c("quadtree", "kdbtree"),
  index_type = c("quadtree", "rtree")
)
```

Arguments

`spatial_rdd`	Spatial RDD containing geometries to be queried.
`query_window_rdd`	Spatial RDD containing the query window(s).
`join_type`	Type of the join query (must be either "contain" or "intersect"). If `join_type` is "contain", then a geometry from `spatial_rdd` will match a geometry from the `query_window_rdd` if and only if the former is fully contained in the latter. If `join_type` is "intersect", then a geometry from `spatial_rdd` will match a geometry from the `query_window_rdd` if and only if the former intersects the latter.
`partitioner`	Spatial partitioning to apply to both `spatial_rdd` and `query_window_rdd` to facilitate the join query. Can be either a grid type (currently "quadtree" and "kdbtree" are supported) or a custom spatial partitioner object. If `partitioner` is NULL, then assume the same spatial partitioner has been applied to both `spatial_rdd` and `query_window_rdd` already and skip the partitioning step.
`index_type`	Controls how `spatial_rdd` and `query_window_rdd` will be indexed (unless they are indexed already). If "NONE", then no index will be constructed and matching geometries will be identified in a doubly nested- loop iterating through all possible pairs of elements from `spatial_rdd` and `query_window_rdd`, which will be inefficient for large data sets.

Value

A spatial RDD containing the join result.

See Also

Other Sedona spatial join operator: `sedona_spatial_join_count_by_key()`

Examples

```
library(sparklyr)
library(apache.sedona)

sc <- spark_connect(master = "spark://HOST:PORT")

if (!inherits(sc, "test_connection")) {
  input_location <- "/dev/null" # replace it with the path to your input file
  rdd <- sedona_read_dsv_to_typed_rdd(
    sc,
    location = input_location,
    delimiter = ",",
    type = "point",
    first_spatial_col_index = 1L
  )
  query_rdd_input_location <- "/dev/null" # replace it with the path to your input file
  query_rdd <- sedona_read_shapefile_to_typed_rdd(
    sc,
    location = query_rdd_input_location,
    type = "polygon"
  )
  join_result_rdd <- sedona_spatial_join(
    rdd,
    query_rdd,
    join_type = "intersect",
    partitioner = "quadtree"
  )
}
```

---

sedona_spatial_join_count_by_key

Perform a spatial count-by-key operation based on two Sedona spatial RDDs.

Description

For each element p from `spatial_rdd`, count the number of unique elements q from `query_window_rdd` such that (p, q) satisfies the spatial relation specified by `join_type`.

Usage

```
sedona_spatial_join_count_by_key(
  spatial_rdd,
  query_window_rdd,
  join_type = c("contain", "intersect"),
  partitioner = c("quadtree", "kdbtree"),
  index_type = c("quadtree", "rtree")
)
```

Arguments

spatial_rdd	Spatial RDD containing geometries to be queried.
query_window_rdd	Spatial RDD containing the query window(s).
join_type	Type of the join query (must be either "contain" or "intersect"). If join_type is "contain", then a geometry from spatial_rdd will match a geometry from the query_window_rdd if and only if the former is fully contained in the latter. If join_type is "intersect", then a geometry from spatial_rdd will match a geometry from the query_window_rdd if and only if the former intersects the latter.
partitioner	Spatial partitioning to apply to both spatial_rdd and query_window_rdd to facilitate the join query. Can be either a grid type (currently "quadtree" and "kdbtree" are supported) or a custom spatial partitioner object. If partitioner is NULL, then assume the same spatial partitioner has been applied to both spatial_rdd and query_window_rdd already and skip the partitioning step.
index_type	Controls how spatial_rdd and query_window_rdd will be indexed (unless they are indexed already). If "NONE", then no index will be constructed and matching geometries will be identified in a doubly nested- loop iterating through all possible pairs of elements from spatial_rdd and query_window_rdd, which will be inefficient for large data sets.

Value

A spatial RDD containing the join-count-by-key results.

See Also

Other Sedona spatial join operator: sedona_spatial_join()

Examples

```
library(sparklyr)
library(apache.sedona)

sc <- spark_connect(master = "spark://HOST:PORT")

if (!inherits(sc, "test_connection")) {
  input_location <- "/dev/null" # replace it with the path to your input file
```

```
  rdd <- sedona_read_dsv_to_typed_rdd(
    sc,
    location = input_location,
    delimiter = ",",
    type = "point",
    first_spatial_col_index = 1L
  )
  query_rdd_input_location <- "/dev/null" # replace it with the path to your input file
  query_rdd <- sedona_read_shapefile_to_typed_rdd(
    sc,
    location = query_rdd_input_location,
    type = "polygon"
  )
  join_result_rdd <- sedona_spatial_join_count_by_key(
    rdd,
    query_rdd,
    join_type = "intersect",
    partitioner = "quadtree"
  )
}
```

`sedona_write_wkb` *Write SpatialRDD into a file.*

Description

Export serialized data from a Sedona SpatialRDD into a file.

- `sedona_write_wkb`:
- `sedona_write_wkt`:
- `sedona_write_geojson`:

Usage

```
sedona_write_wkb(x, output_location)

sedona_write_wkt(x, output_location)

sedona_write_geojson(x, output_location)
```

Arguments

`x`	The SpatialRDD object.
`output_location`	Location of the output file.

Value

No return value.

See Also

Other Sedona RDD data interface functions: sedona_read_dsv_to_typed_rdd(), sedona_read_geojson(), sedona_read_shapefile_to_typed_rdd(), sedona_save_spatial_rdd()

Examples

```
library(sparklyr)
library(apache.sedona)

sc <- spark_connect(master = "spark://HOST:PORT")

if (!inherits(sc, "test_connection")) {
  input_location <- "/dev/null" # replace it with the path to your input file
  rdd <- sedona_read_wkb(
    sc,
    location = input_location,
    wkb_col_idx = 0L
  )
  sedona_write_wkb(rdd, "/tmp/wkb_output.tsv")
}
```

---

spark_read_shapefile *Read geospatial data into a Spark DataFrame.*

Description

[Deprecated]

These functions are deprecated and will be removed in a future release. Sedona has been implementing readers as spark DataFrame sources, so you can use spark_read_source with the right sources ("shapefile", "geojson", "geoparquet") to read geospatial data.

Functions to read geospatial data from a variety of formats into Spark DataFrames.

- spark_read_shapefile: from a shapefile
- spark_read_geojson: from a geojson file
- spark_read_geoparquet: from a geoparquet file

Usage

```
spark_read_shapefile(sc, name = NULL, path = name, options = list(), ...)

spark_read_geojson(
  sc,
  name = NULL,
  path = name,
  options = list(),
  repartition = 0,
```

```
  memory = TRUE,
  overwrite = TRUE
)

spark_read_geoparquet(
  sc,
  name = NULL,
  path = name,
  options = list(),
  repartition = 0,
  memory = TRUE,
  overwrite = TRUE
)
```

Arguments

sc	A spark_connection.
name	The name to assign to the newly generated table.
path	The path to the file. Needs to be accessible from the cluster. Supports the '"hdfs://"', '"s3a://"' and '"file://"' protocols.
options	A list of strings with additional options. See https://spark.apache.org/docs/latest/sql-programming-guide.html#configuration.
...	Optional arguments; currently unused.
repartition	The number of partitions used to distribute the generated table. Use 0 (the default) to avoid partitioning.
memory	Boolean; should the data be loaded eagerly into memory? (That is, should the table be cached?)
overwrite	Boolean; overwrite the table with the given name if it already exists?

Value

A tbl

See Also

Other Sedona DF data interface functions: spark_write_geojson()

Examples

```
library(sparklyr)
library(apache.sedona)

sc <- spark_connect(master = "spark://HOST:PORT")

if (!inherits(sc, "test_connection")) {
  input_location <- "/dev/null" # replace it with the path to your input file
  rdd <- spark_read_shapefile(sc, location = input_location)
}
```

spark_write_geojson *Write geospatial data from a Spark DataFrame.*

Description

[Deprecated]

These functions are deprecated and will be removed in a future release. Sedona has been implementing writers as spark DataFrame sources, so you can use `spark_write_source` with the right sources ("shapefile", "geojson", "geoparquet") to write geospatial data.

Functions to write geospatial data into a variety of formats from Spark DataFrames.

- `spark_write_geojson`: to GeoJSON
- `spark_write_geoparquet`: to GeoParquet
- `spark_write_raster`: to raster tiles after using RS output functions (`RS_AsXXX`)

Usage

```
spark_write_geojson(
  x,
  path,
  mode = NULL,
  options = list(),
  partition_by = NULL,
  ...
)

spark_write_geoparquet(
  x,
  path,
  mode = NULL,
  options = list(),
  partition_by = NULL,
  ...
)

spark_write_raster(
  x,
  path,
  mode = NULL,
  options = list(),
  partition_by = NULL,
  ...
)
```

Arguments

x	A Spark DataFrame or dplyr operation
path	The path to the file. Needs to be accessible from the cluster. Supports the '"hdfs://"', '"s3a://"' and '"file://"' protocols.
mode	A character element. Specifies the behavior when data or table already exists. Supported values include: 'error', 'append', 'overwrite' and ignore. Notice that 'overwrite' will also change the column structure. For more details see also https://spark.apache.org/docs/latest/sql-programming-guide.html#save-modes for your version of Spark.
options	A list of strings with additional options.
partition_by	A character vector. Partitions the output by the given columns on the file system.
...	Optional arguments; currently unused.

See Also

Other Sedona DF data interface functions: spark_read_shapefile()

Examples

```
library(sparklyr)
library(apache.sedona)

sc <- spark_connect(master = "spark://HOST:PORT")

if (!inherits(sc, "test_connection")) {
  tbl <- dplyr::tbl(
    sc,
    dplyr::sql("SELECT ST_GeomFromText('POINT(-71.064544 42.28787)') AS `pt`")
  )
  spark_write_geojson(
    tbl %>% dplyr::mutate(id = 1),
    output_location = "/tmp/pts.geojson"
  )
}
```

---

to_spatial_rdd *Export a Spark SQL query with a spatial column into a Sedona spatial RDD.*

Description

Given a Spark dataframe object or a dplyr expression encapsulating a Spark SQL query, build a Sedona spatial RDD that will encapsulate the same query or data source. The input should contain exactly one spatial column and all other non-spatial columns will be treated as custom user-defined attributes in the resulting spatial RDD.

Usage

```
to_spatial_rdd(x, spatial_col)
```

Arguments

x	A Spark dataframe object in sparklyr or a dplyr expression representing a Spark SQL query.
spatial_col	The name of the spatial column.

Value

A SpatialRDD encapsulating the query.

Examples

```
library(sparklyr)
library(apache.sedona)

sc <- spark_connect(master = "spark://HOST:PORT")

if (!inherits(sc, "test_connection")) {
  tbl <- dplyr::tbl(
    sc,
    dplyr::sql("SELECT ST_GeomFromText('POINT(-71.064544 42.28787)') AS `pt`")
  )
  rdd <- to_spatial_rdd(tbl, "pt")
}
```

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