

Reproducing the Shiny app workflow

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This vignette reproduces the main path through the Spatial Methods Workbench using small, deterministic simulated data. The same seed produces the same CSV and statistical output. No protected data, private method, or unpublished manuscript content is required.

0.1 1. Create upload-ready demonstration files

```
spatial <- demo_spatial_data(n = 72, seed = 2026)
image <- demo_image_data(n = 48, features = 8, seed = 2026)
contour <- demo_contour_data(contours = 6, points = 16, seed = 2026)
volume <- demo_spatial_3d_data(n = 72, volumes = 2, seed = 2026)

vapply(list(spatial = spatial, image = image, contour = contour, volume = volume), nrow, integer(1))
#> spatial image contour volume
#>      72      48      96      72
```

Write any dataset to CSV, then upload it through **01 · DATA** in the app.

```
demo_dir <- file.path(tempdir(), "spatial-workbench-vignettes")
dir.create(demo_dir, showWarnings = FALSE)
utils::write.csv(spatial, file.path(demo_dir, "spatial_demo.csv"), row.names = FALSE)
utils::write.csv(image, file.path(demo_dir, "image_demo.csv"), row.names = FALSE)
utils::write.csv(contour, file.path(demo_dir, "contour_demo.csv"), row.names = FALSE)
utils::write.csv(volume, file.path(demo_dir, "spatial_3d_demo.csv"), row.names = FALSE)
basename(list.files(demo_dir))
#> [1] "contour_demo.csv"      "image_demo.csv"      "spatial_3d_demo.csv"
#> [4] "spatial_demo.csv"
```

Start the app from the repository root with `shiny::runApp()` or use the [live application](#).

0.2 2. Reproduce column mapping

For `spatial_demo.csv`, select the following roles in **02 · COLUMN MAP**.

App role	Column
X coordinate	x
Y coordinate	y
Region / zone	zone
Sample / contour / volume ID	sample_id
Outcome	disease

App role	Column
Exposure	epithelial
Mediator	APC
Numeric features	epithelial, APC, CTL, Treg, T_helper

The programmatic equivalent is:

```
mapping <- coerce_mapping(spatial, list(
  x = "x", y = "y", z = NULL, zone = "zone", id = "sample_id",
  outcome = "disease", exposure = "epithelial", mediator = "APC"
))
features <- c("epithelial", "APC", "CTL", "Treg", "T_helper")
validate_dataset(spatial, mapping)[c("ok", "n", "p", "missing_rate")]
#> $ok
#> [1] TRUE
#>
#> $n
#> [1] 72
#>
#> $p
#> [1] 10
#>
#> $missing_rate
#> [1] 0
```

0.3 3. Reproduce readiness checks

```
readiness <- recommend_methods(spatial, mapping, features)
data.frame(
  analysis = names(readiness),
  compatible = vapply(readiness, `[`, logical(1), "compatible"),
  reason = vapply(readiness, `[`, character(1), "reason"),
  row.names = NULL
)
#>               analysis compatible
#> 1      spatial_qc      TRUE
#> 2 conditional_network      TRUE
#> 3          ispat      TRUE
#> 4          gpghs      TRUE
#> 5       ispat3d     FALSE
#> 6       spatial_ml      TRUE
#> 7 spatial_clustering      TRUE
#> 8  neural_prediction      TRUE
#> 9      scalar_image      TRUE
#> 10 image_to_image     FALSE
#> 11      mediation      TRUE
#> 12      shape_pca      TRUE
#>
#>               reason
#> 1
#> 2
#> 3
#> 4
```

```
#> 5 Select z
#> 6
#> 7
#> 8
#> 9
#> 10 Select at least three input__ and three output__ image columns
#> 11
#> 12
```

Readiness describes whether the mapped table satisfies each input contract and whether an optional engine is installed. It is not a scientific recommendation.

0.4 4. Reproduce an app run

In **03 · ANALYSIS**, choose **Spatial exploration & autocorrelation**, select **epithelial**, set six neighbors and 19 permutations, acknowledge the citation condition, and run. The equivalent call is:

```
result <- run_analysis(
  "spatial_qc", spatial, mapping, features,
  params = list(feature = "epithelial", neighbors = 6, permutations = 19, seed = 2026)
)
result$table
#>           metric      value
#> 1 Complete observations 72.0000000
#> 2           Neighbors  6.0000000
#> 3           Moran's I  0.7019779
#> 4  Permutation p-value  0.0500000
```

```
result$plot
```

The table, plot, summary, controls, mappings, citations, and fitted result object are retained. This vignette does not interpret the numerical result.

0.5 5. Reproduce the download

```
bundle <- file.path(tempdir(), "spatial-workbench-example.zip")
write_result_bundle(result, bundle)
utils::unzip(bundle, list = TRUE)$Name
#> [1] "CITATION.txt"      "COLLABORATION.txt" "figure.png"
#> [4] "manifest.json"     "result_object.rds" "results.csv"
```

The archive contains the numerical table, figure, manifest, R object, citations, and collaboration notice. It does not contain the uploaded data or an automated interpretation.

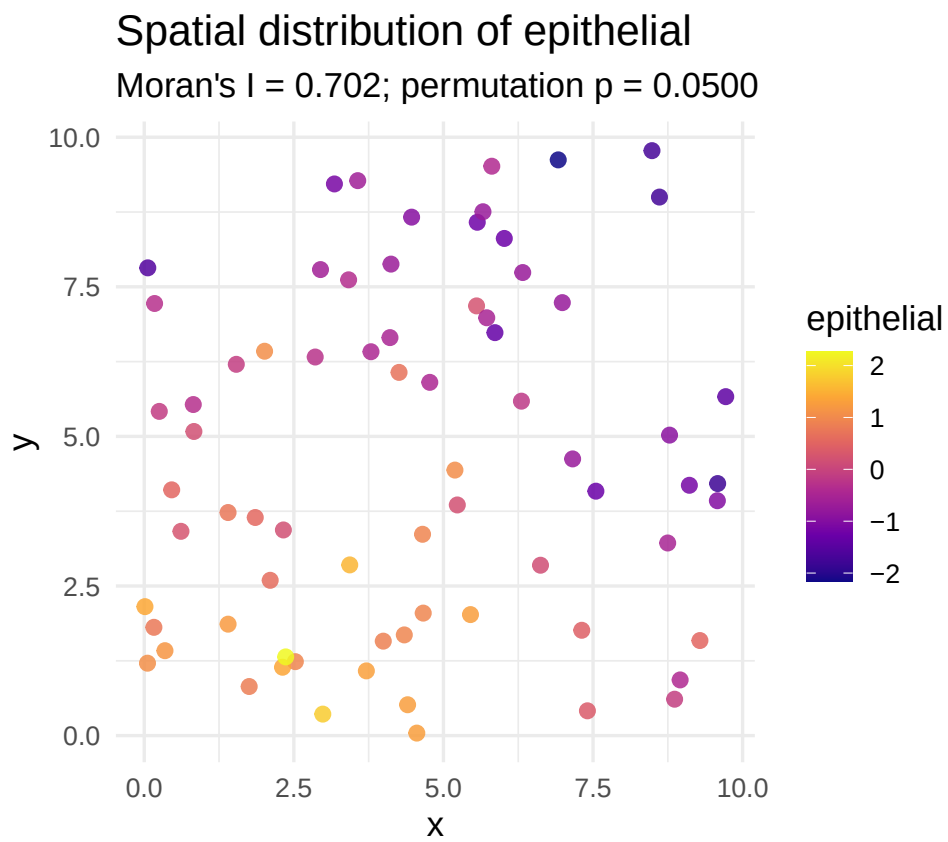


Figure 1: Synthetic-data output from the same workflow used by the app.