

ArcGIS® 3: Performing Analysis

STUDENT EDITION

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Course version 5.0. Version release date January 2017.

Printed in the United States of America.

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Course introduction

- Introduction
- Course goals
- Additional resources
- Installing the course data
- Icons used in this workbook
- Understanding the ArcGIS Platform

1 Getting started with spatial analysis

- Lesson introduction
- What is spatial analysis?
- Proximity analysis
- Overlay analysis
- Statistical analysis
- Temporal analysis
- The spatial analysis workflow
- Frame the question
- Exercise 1: Apply the spatial analysis workflow to solve a problem
 - Frame the question
 - Explore the data
 - Choose methods and tools
 - Perform the analysis
 - Examine the results
 - Share the results in a report
- Lesson review

2 Planning and preparing for analysis

- Lesson introduction
- Planning for analysis
- Analysis methods
- Raster data considerations
- Preparing points for raster analysis
- Data quality
- Standardizing spatial reference
- Working with geoprocessing environments and documentation
- Data preparation for raster analysis: Interpolation
- Exercise 2: Prepare data for a site selection analysis
 - Explore the data
 - Create the study area boundary
 - Make environment settings
 - Clip the roads to the study area
 - Reduce extent of elevation raster to the study area
 - Convert zoning polygons to raster
 - Create a raster containing only agricultural zoning

Enhance the map's appearance
Lesson review

3 Performing proximity analysis

Lesson introduction
What is proximity analysis?
When to use proximity analysis
Categories of proximity analysis
How do ArcGIS tools measure proximity?
Buffering at a world scale
Data type and proximity analysis
Calculating decibel levels with raster proximity analysis
Exercise 3: Use proximity analysis for emergency planning
 Allocate resources to each school
 Determine straight-line distances between hospitals and schools
 Calculate flight times for air ambulances
 Identify traffic control areas
 Identify roads within each traffic control area
Lesson review

4 Performing overlay analysis with vector data

Lesson introduction
What is overlay analysis?
Overlay techniques
Performing overlay
Apportioning attributes
Overlay with Use Ratio Policy
Exercise 4: Use overlay analysis to assess risk of tornado damage
 Explore the data
 Determine critical facilities in the tornado path
 Estimate road damage
 Create a new model
 Add an iterator
 Make a feature layer
 Overlay parcels with the tornado path
 Add a field to store property loss
 Calculate damage values
 Summarize total property damage
 Prepare the model to run as a tool
 Run the model and view results
 Share the model as a geoprocessing package
 Test the geoprocessing package
Lesson review

5 Performing overlay analysis with raster data

Lesson introduction

What is raster overlay?

Deriving surfaces from raster sources

Deriving rasters from vector sources

Locating a vineyard using raster overlay

Binary overlay analysis

Weighted overlay analysis

Weighted overlay workflow

A typical raster overlay question

Reclassification

Considerations for reclassification

Assigning weights

Exercise 5: Locate a vineyard using raster overlay

- Open the map and explore data

- Derive a slope surface from elevation

- Derive a distance from highways surface

- Examine raster cell values

- Manually reclassify the elevation raster

- Reclassify distance using remap file

- Reclassify slope using remap file

- Overlay rasters using Raster Calculator

- Modify weights and rerun Raster Calculator

- Use the Raster Calculator to combine cells ranked 4 and 5

Lesson review

6 Analyzing spatial patterns

Lesson introduction

What is a spatial pattern?

Exploring descriptive statistics

Mean center

Standard deviational ellipses

Working with data distributions

The Average Nearest Neighbor tool

The Spatial Autocorrelation tool

Hot spot analysis

Exploring patterns

Exercise 6: Analyze 911 incident distribution using spatial statistics

- Explore the data

- Run the Average Nearest Neighbor tool

- Run the Spatial Autocorrelation tool

- Perform hot spot analysis to aggregate incidents and locate hot spots

- Perform hot spot analysis on response times for 911 incidents

Lesson review

7 Analyzing temporal patterns

Lesson introduction

What is temporal analysis?

Working with time-aware data

Incorporating time in your analysis

Temporal analysis of piracy incidents

Temporal patterns and spatial statistics

Measuring statistics over time

Space-time analysis

Grouping analysis

Exercise 7A: Analyze temporal patterns in piracy data

- Visually analyze patterns in the data

- Use the time slider to analyze incidents by date

- Analyze temporal patterns

- Create time series animation

Exercise 7B: Space-time cluster analysis

- Explore incident data

- Aggregate incident data

- Create a space-time window

- Perform space-time hot spot analysis

Exercise 7C: Perform grouping analysis

- Visually analyze 911 data

- Run multivariate grouping analysis

- Run grouping analysis by weekday

Lesson review

Appendixes

Appendix A: Esri data license agreement

Appendix B: Answers to lesson review questions

- Lesson 1: Getting started with spatial analysis

- Lesson 2: Planning and preparing for analysis

- Lesson 3: Performing proximity analysis

- Lesson 4: Performing overlay analysis with vector data

- Lesson 5: Performing overlay analysis with raster data

- Lesson 6: Analyzing spatial patterns

- Lesson 7: Analyzing temporal patterns