

# CONTENTS

<b>About the Authors</b>	<b>vii</b>
<b>Series Editor's Introduction</b>	<b>viii</b>
<b>Preface</b>	<b>ix</b>
<b>Chapter 1. Introduction to Fractals</b>	<b>1</b>
Mandelbrot	1
What Are Fractals?	2
<i>Sets</i>	2
<i>Self-Similarity</i>	3
<i>Scale Invariance</i>	5
<i>Power Law Relations</i>	5
Fractal Dimension: Quantifying Fractal Properties	15
The Formal Definition of Fractals	20
<i>Topological Dimension</i>	21
<i>Hausdorff Besicovitch Dimension</i>	21
Discussion	23
<b>Chapter 2. Fractal Analysis of Frequency Distributions</b>	<b>26</b>
Power Laws	26
<i>Three Methods: Histogram PDF, Multiscale PDF, and Cumulative Distribution</i>	27
<i>Examples With Lots of Data</i>	32
<i>Examples With a Small Amount of Data</i>	36
Summary	39
<b>Chapter 3. Fractal Patterns Embedded in Two Dimensions</b>	<b>40</b>
Estimating the Fractal Dimension of Empirical Data	45
<i>The Divider Method: How Long Is the Coast of Britain?</i>	46
<i>The Box-Counting Method</i>	48
<i>Applying the Method in Practice</i>	53
Summary and Discussion	54

<b>Chapter 4. Social Processes That Generate Fractals</b>	<b>56</b>
How We Do Our “To Do” Lists: Preferential Priorities	56
How We Kill: Attendant Causes, Self-Organized Criticality, and Agent-Based Models	57
How We Network: Preferential Attachment	59
How We Decide Where to Live: Diffusion Limited Aggregation	60
How We Look for Food: Lévy Flights	61
How We Live Together: Balancing Cohesive and Disruptive Forces	62
Summary and Discussion	62
<b>Chapter 5. Advanced Topics in Fractal Analysis</b>	<b>64</b>
Multiscaling Fractal Patterns	65
Patterns Embedded in Three Dimensions	67
Self-Affine Fractals	67
Fractal Time Series	68
Multifractals	72
Lacunarity	73
Conclusion	74
<b>Chapter 6. Final Considerations</b>	<b>75</b>
Should I Try Fractal Analysis?	75
<i>Caveats</i>	76
<b>References</b>	<b>79</b>
<b>Author Index</b>	<b>85</b>
<b>Subject Index</b>	<b>88</b>