

Possible Textbooks for ANNE

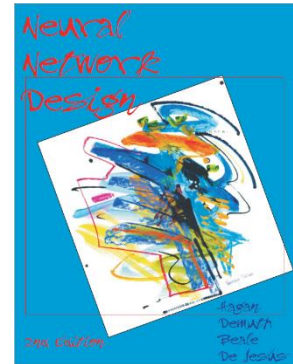
Dean Hougen

Neural Network Design, 2nd Edition

Martin T. Hagan, Howard B. Demuth, Mark Hudson Beale, and Orlando De Jesús

1012 pages, self-published, 2014 (apparently), free PDF available from author's website

<https://hagan.okstate.edu/NNDesign.pdf>



Strengths

- Good explanation of simple ANN function in 1st edition
- Free

Weaknesses

- ANNs only (no EC or neuroevolution)
- TOC is messed up

Coverage Score: 7¹

Verdict: **Reasonable for coverage of ANNs only**

- Needs to be combined with a deep learning material, EC book, and neuroevolution material.

¹ Score is sum of Ys for bottom level topics in all sections except Computational Intelligence.

Covered	Topic
N	<i>Computational Intelligence</i>
Y/N	Information Representation
Y*	functions
Y*	time series
Y*	classes
Y*	clusters
N	policies
Y/N	Learning
Y*	supervised learning
Y*	unsupervised learning
N	reinforcement learning
Y	<i>Artificial Neural Networks</i>
Y	Fundamentals
Y	biological inspiration
Y	neural computational elements
Y	Topologies
Y	feedforward
Y	laterally connected
Y	recurrent
N	deep
Y/N	Learning
Y	supervised learning
Y	unsupervised learning
N	reinforcement learning
N	<i>Evolutionary Computation</i>
N	Fundamentals
N	biological inspiration
N	populations, genes, etc.
N	EC Methods
N	genetic algorithms
N	genetic programming
N	evolutionary programming
N	evolution strategies
N	grammatical evolution
N	cultural evolution
N	Artificial Life
N	Neuroevolution
N	Weight Evolution
N	Topology Evolution
N	Learning Rule Evolution
N	Combinations
N	ANNs in Alife
N	Evolutionary Robotics

*Only in the context of ANNs.

Computational Intelligence: Concepts to Implementations

Russell C. Eberhart and Yuhui Shi

543 pages, Elsevier/Morgan Kaufman, 2007, free PDF available

Strengths

- Free
- ??

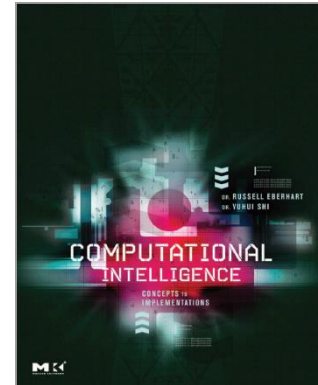
Weaknesses

- TOC is somewhat messed up
- Odd terminology regarding adaptation vs learning
- Seems a bit confusing in terms of organization
- The neuroevolutionary material is stuck in as an implementation issue, rather than a conceptual issue along with implementation

Coverage Score: 14.5

Verdict: **Reject**

- This book looks to be a generally strong contender as a general textbook covering all major topics for the course. However, getting into the details, it doesn't do so well.



Covered	Topic
Y	<i>Computational Intelligence</i>
Y/N	Information Representation
Y	functions
N	time series
Y	classes
Y	clusters
Y	policies
Y	Learning
Y	supervised learning
Y	unsupervised learning
Y	reinforcement learning
Y/N	<i>Artificial Neural Networks</i>
Y	Fundamentals
Y	biological inspiration
Y	neural computational elements
Y/N	Topologies
Y	feedforward
Y	laterally connected
Y/N	recurrent
N	deep
Y/N	Learning
Y	supervised learning
Y	unsupervised learning
Y/N	reinforcement learning
Y/N	<i>Evolutionary Computation</i>
Y	Fundamentals
Y	biological inspiration
Y	populations, genes, etc.
Y/N	EC Methods
Y	genetic algorithms
Y	genetic programming
Y	evolutionary programming
Y	evolution strategies
N	grammatical evolution
N	cultural evolution
N	Artificial Life
Y/N	Neuroevolution
Y/N	Weight Evolution
Y/N	Topology Evolution
Y/N	Learning Rule Evolution
Y/N	Combinations
N	ANNs in Alife
N	Evolutionary Robotics

Computational Intelligence: A Methodological Introduction

Rudolf Kruse, Christian Borgelt, Frank Klawonn, Christian Moewes, Matthias Steinbrecher, and Pascal Held

482 pages, Springer, 2013, free PDF available

<https://link.springer.com/book/10.1007%2F978-1-4471-5013-8>

Strengths

- Free
- ??

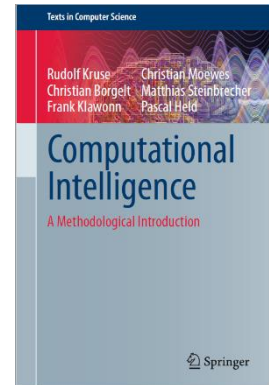
Weaknesses

- Odd terminology: Calls supervised learning tasks "fixed" and unsupervised learning tasks "free"

Coverage Score: 12

Verdict: **Reject**

There is a newer (2016) edition of this book with slightly greater coverage. That edition is also free. Consequently, there seems to be no compelling reason to consider this textbook.



Covered	Topic
Y/N	<i>Computational Intelligence</i>
Y/N	Information Representation
Y	functions
N	time series
Y	classes
Y	clusters
N	policies
N	Learning
N	supervised learning
N	unsupervised learning
N	reinforcement learning
Y	<i>Artificial Neural Networks</i>
Y	Fundamentals
Y	biological inspiration
Y	neural computational elements
Y/N	Topologies
Y	feedforward
Y	laterally connected
Y	recurrent
N	deep
Y/N	Learning
Y	supervised learning
Y	unsupervised learning
N	reinforcement learning
Y/N	<i>Evolutionary Computation</i>
Y	Fundamentals
Y	biological inspiration
Y	populations, genes, etc.
Y/N	EC Methods
Y	genetic algorithms
Y	genetic programming
N	evolutionary programming
Y	evolution strategies
N	grammatical evolution
N	cultural evolution
N	Artificial Life
N	Neuroevolution
N	Weight Evolution
N	Topology Evolution
N	Learning Rule Evolution
N	Combinations
N	ANNs in Alife
N	Evolutionary Robotics

Computational Intelligence: A Methodological Introduction, Second Edition

Rudolf Kruse, Christian Borgelt, Christian Braune, Sanaz Mostaghim, and Matthias Steinbrecher

556 pages, Springer, 2016, free PDF available, 978-1-4471-7294-9

<https://link.springer.com/book/10.1007%2F978-1-4471-7296-3>

Strengths

- Free
- ??

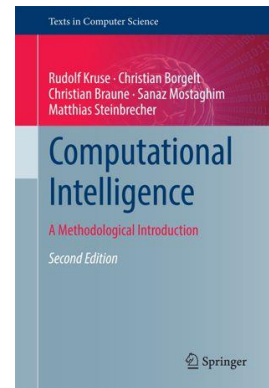
Weaknesses

- Odd terminology: Calls supervised learning tasks "fixed" and unsupervised learning tasks "free"

Coverage Score: 12.5

Verdict: **Probably reasonable as General Main Text**

This book looks to be a generally strong contender as a general textbook covering most major topics for the course. It doesn't cover learning in general, but it does consider supervised and unsupervised (though not reinforcement) learning in the context of ANNs and also includes some EC methods. No neuroevolution, but that is not surprising. Does include a little on deep ANN topologies.



Covered	Topic
Y/N	<i>Computational Intelligence</i>
Y/N	Information Representation
Y	functions
Y/N	time series
Y	classes
Y	clusters
Y/N	policies
N	Learning
N	supervised learning
N	unsupervised learning
N	reinforcement learning
Y	<i>Artificial Neural Networks</i>
Y	Fundamentals
Y	biological inspiration
Y	neural computational elements
Y/N	Topologies
Y	feedforward
Y	laterally connected
Y	recurrent
Y/N	deep
Y/N	Learning
Y	supervised learning
Y	unsupervised learning
N	reinforcement learning
Y/N	<i>Evolutionary Computation</i>
Y	Fundamentals
Y	biological inspiration
Y	populations, genes, etc.
Y/N	EC Methods
Y	genetic algorithms
Y	genetic programming
N	evolutionary programming
Y	evolution strategies
N	grammatical evolution
N	cultural evolution
N	Artificial Life
N	Neuroevolution
N	Weight Evolution
N	Topology Evolution
N	Learning Rule Evolution
N	Combinations
N	ANNs in Alife
N	Evolutionary Robotics

Computational Intelligence: Principles, Techniques and Applications

Amit Konar

<https://link-springer-com.ezproxy.lib.ou.edu/book/10.1007%2Fb138935>

714 pages, Springer, 2005, free PDF available

Strengths

- Free
- ??

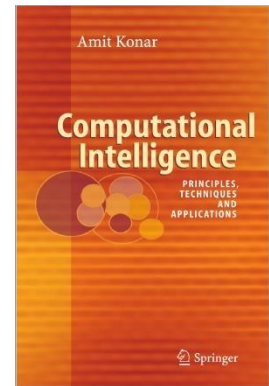
Weaknesses

- No PDF TOC
- PDF search beyond the first few pages is impossible

Coverage Score: 13

Verdict: **Reject**

The coverage seems overall relatively good but not outstanding. The book is older and the PDF has some problems.



Covered	Topic
Y/N	<i>Computational Intelligence</i>
N	Information Representation
N	functions
N	time series
N	classes
N	clusters
N	policies
Y	Learning
Y	supervised learning
Y	unsupervised learning
Y	reinforcement learning
Y	<i>Artificial Neural Networks</i>
Y	Fundamentals
Y	biological inspiration
Y	neural computational elements
Y/N	Topologies
Y	feedforward
Y	laterally connected
Y	recurrent
N	deep
Y	Learning
Y	supervised learning
Y	unsupervised learning
Y	reinforcement learning
Y/N	<i>Evolutionary Computation</i>
Y	Fundamentals
Y	biological inspiration
Y	populations, genes, etc.
Y/N	EC Methods
Y	genetic algorithms
Y/N	genetic programming
N	evolutionary programming
N	evolution strategies
N	grammatical evolution
N	cultural evolution
Y/N	Artificial Life
Y/N	Neuroevolution
N	Weight Evolution
N	Topology Evolution
Y/N	Learning Rule Evolution
N	Combinations
N	ANNs in Alife
Y	Evolutionary Robotics

Computational Intelligence: Synergies of Fuzzy Logic, Neural Networks, and Evolutionary Computation

Nazmul Siddique and Hojjat Adeli

517 pages, Wiley, 2013, free PDF available, ISBN 978-1-118-33784-4

<https://onlinelibrary.wiley.com/doi/book/10.1002/9781118534823>

Strengths

- Free
- Has a chapter on neuroevolution

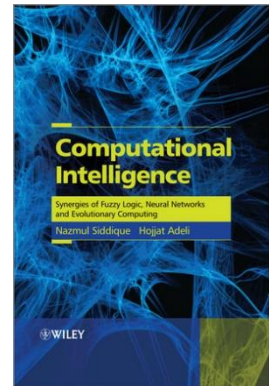
Weaknesses

- No PDF TOC

Coverage Score: 18

Verdict: **Probably reasonable as General Main Text**

This book looks to be a generally strong contender as a general textbook covering all major topics for the course. Needs further investigation.



Covered	Topic
Y/N	<i>Computational Intelligence</i>
Y/N	Information Representation
Y	functions
N	time series
Y	classes
Y	clusters
N	policies
Y	Learning
Y	supervised learning
Y	unsupervised learning
Y	reinforcement learning
Y/N	<i>Artificial Neural Networks</i>
Y	Fundamentals
Y	biological inspiration
Y	neural computational elements
Y/N	Topologies
Y	feedforward
N	laterally connected
Y	recurrent
N	deep
Y/N	Learning
Y	supervised learning
Y	unsupervised learning
Y/N	reinforcement learning
Y	<i>Evolutionary Computation</i>
Y	Fundamentals
Y	biological inspiration
Y	populations, genes, etc.
Y/N	EC Methods
Y	genetic algorithms
Y	genetic programming
Y	evolutionary programming
Y	evolution strategies
N	grammatical evolution
Y	cultural evolution
N	Artificial Life
Y	Neuroevolution
Y	Weight Evolution
Y	Topology Evolution
Y	Learning Rule Evolution
Y	Combinations
N	ANNs in Alife
Y/N	Evolutionary Robotics

Computational Intelligence: An Introduction, Second Edition

Andries P. Engelbrecht

630 pages, Wiley, 2007, free PDF available

Strengths

- Free
- Has a good track record in the course.

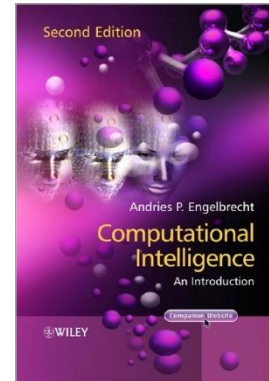
Weaknesses

- Some errors

Coverage Score: 15

Verdict: **Reasonable as General Main Text**

This book is a generally strong contender as a general textbook covering most major topics for the course.



Covered	Topic
Y/N	<i>Computational Intelligence</i>
Y/N	Information Representation
Y	functions
N	time series
Y	classes
Y	clusters
Y	policies
Y/N	Learning
Y/N	supervised learning
Y/N	unsupervised learning
Y/N	reinforcement learning
Y	<i>Artificial Neural Networks</i>
Y	Fundamentals
Y	biological inspiration
Y	neural computational elements
Y/N	Topologies
Y	feedforward
Y	laterally connected
Y	recurrent
N	deep
Y	Learning
Y	supervised learning
Y	unsupervised learning
Y	reinforcement learning
Y	<i>Evolutionary Computation</i>
Y	Fundamentals
Y	biological inspiration
Y	populations, genes, etc.
Y/N	EC Methods
Y	genetic algorithms
Y	genetic programming
Y	evolutionary programming
Y	evolution strategies
N	grammatical evolution
Y	cultural evolution
N	Artificial Life
N	Neuroevolution
N	Weight Evolution
N	Topology Evolution
N	Learning Rule Evolution
N	Combinations
N	ANNs in Alife
N	Evolutionary Robotics

Bio-Inspired Artificial Intelligence: Theories, Methods, and Technologies

Dario Floreano and Claudio Mattiussi

674 pages, The MIT Press, 2008, free PDF available

Strengths

- Free
- Has a good track record in the course.

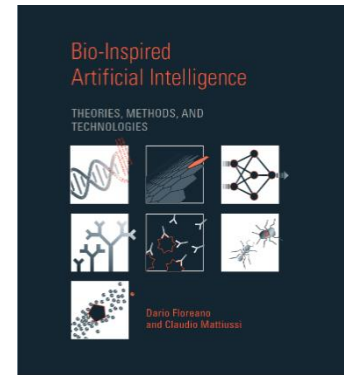
Weaknesses

- PDF TOC only top level

Coverage Score: 18

Verdict: **Reasonable as General Main Text**

This book is a generally strong contender as a general textbook covering all major topics for the course.



Covered	Topic
N	<i>Computational Intelligence</i>
N	Information Representation
N	functions
N	time series
N	classes
N	clusters
N	policies
N	Learning
N	supervised learning
N	unsupervised learning
N	reinforcement learning
Y	<i>Artificial Neural Networks</i>
Y	Fundamentals
Y	biological inspiration
Y	neural computational elements
Y/N	Topologies
Y	feedforward
Y	laterally connected
Y	recurrent
N	deep
Y	Learning
Y	supervised learning
Y	unsupervised learning
Y	reinforcement learning
Y	<i>Evolutionary Computation</i>
Y	Fundamentals
Y	biological inspiration
Y	populations, genes, etc.
Y/N	EC Methods
Y/N	genetic algorithms
Y/N	genetic programming
Y/N	evolutionary programming
Y/N	evolution strategies
N	grammatical evolution
N	cultural evolution
Y	Artificial Life
Y	Neuroevolution
Y	Weight Evolution
Y	Topology Evolution
Y	Learning Rule Evolution
Y	Combinations
N	ANNs in Alife
Y	Evolutionary Robotics

Fundamentals of Computational Intelligence: Neural Networks, Fuzzy Systems, and Evolutionary Computation (IEEE Press Series on Computational Intelligence) 1st Edition

James M. Keller, Derong Liu, and David B. Fogel

378 pages, IEEE Press/Wiley, 2016, \$120/\$97 (ebook) from publisher; \$25-\$50 from Amazon

Strengths

- ??

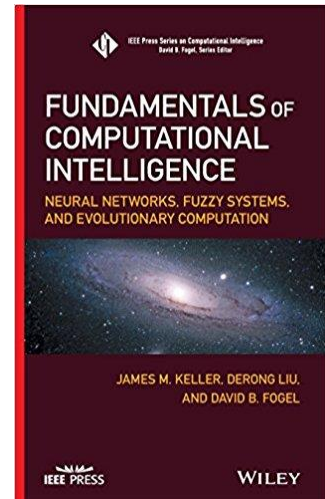
Weaknesses

- No PDF available without paying out big bucks

Coverage Score: 10

Verdict: **Reject**

Cost is too great for coverage provided.



Covered	Topic
N	<i>Computational Intelligence</i>
N	Information Representation
N	functions
N	time series
N	classes
N	clusters
N	policies
N	Learning
N	supervised learning
N	unsupervised learning
N	reinforcement learning
Y/N	<i>Artificial Neural Networks</i>
Y	Fundamentals
Y	biological inspiration
Y	neural computational elements
Y/N	Topologies
Y	feedforward
N	laterally connected
Y	recurrent
N	deep
Y/N	Learning
Y	supervised learning
Y	unsupervised learning
N	reinforcement learning
Y/N	<i>Evolutionary Computation</i>
Y	Fundamentals
Y	biological inspiration
Y	populations, genes, etc.
Y/N	EC Methods
Y/N	genetic algorithms
Y/N	genetic programming
Y/N	evolutionary programming
Y/N	evolution strategies
N	grammatical evolution
N	cultural evolution
N	Artificial Life
N	Neuroevolution
N	Weight Evolution
N	Topology Evolution
N	Learning Rule Evolution
N	Combinations
N	ANNs in Alife
N	Evolutionary Robotics

The Fundamentals of Computational Intelligence: System Approach

Mikhail Z. Zgurovsky and Yuriy P. Zaychenko

389 pages, Springer, 2017, \$149 (ebook) from publisher;

Strengths

- ??

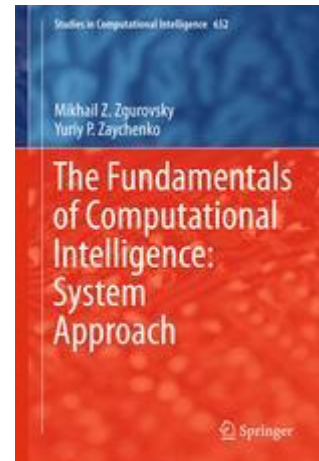
Weaknesses

- No PDF available without paying out big bucks

Coverage Score: 11

Verdict: **Reject**

Cost is too great for coverage provided.



Covered	Topic
Y/N	<i>Computational Intelligence</i>
Y/N	Information Representation
Y	functions
N	time series
Y	classes
Y	clusters
N	policies
Y/N	Learning
Y	supervised learning
Y	unsupervised learning
N	reinforcement learning
Y/N	<i>Artificial Neural Networks</i>
Y	Fundamentals
Y	biological inspiration
Y	neural computational elements
Y/N	Topologies
Y	feedforward
Y	laterally connected
Y	recurrent
N	deep
Y/N	Learning
Y	supervised learning
Y	unsupervised learning
N	reinforcement learning
Y/N	<i>Evolutionary Computation</i>
Y	Fundamentals
Y	biological inspiration
Y	populations, genes, etc.
Y/N	EC Methods
Y	genetic algorithms
N	genetic programming
Y	evolutionary programming
N	evolution strategies
N	grammatical evolution
N	cultural evolution
N	Artificial Life
N	Neuroevolution
N	Weight Evolution
N	Topology Evolution
N	Learning Rule Evolution
N	Combinations
N	ANNs in Alife
N	Evolutionary Robotics

Springer Handbook of Computational Intelligence

Janusz Kacprzyk and Witold Pedrycz (Eds.)

1637 pages, Springer, 2015, free PDF available, 978-3-662-43504-5

<https://link.springer.com/book/10.1007%2F978-3-662-43505-2>

Strengths

- ??

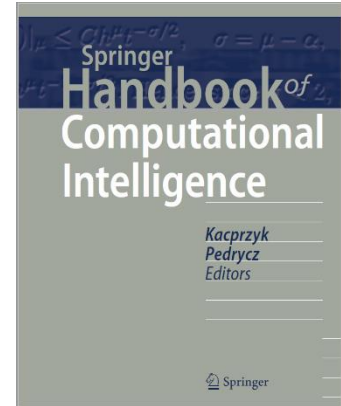
Weaknesses

- ??

Coverage Score: 15

Verdict: **Probably reasonable as General Main Text**

This book looks to be a generally strong contender as a general textbook covering CI in general and ANNs (including deep architectures) in particular, it appears. However, it appears weak on EC and would need to be supplemented. Needs further investigation.



Covered	Topic
Y	<i>Computational Intelligence</i>
Y	Information Representation
Y	functions
Y	time series
Y	classes
Y	clusters
Y	policies
Y	Learning
Y	supervised learning
Y	unsupervised learning
Y	reinforcement learning
Y	<i>Artificial Neural Networks</i>
Y	Fundamentals
Y	biological inspiration
Y	neural computational elements
Y	Topologies
Y	feedforward
Y	laterally connected
Y	recurrent
Y	deep
Y	Learning
Y	supervised learning
Y	unsupervised learning
Y	reinforcement learning
Y/N	<i>Evolutionary Computation</i>
N	Fundamentals
N	biological inspiration
N	populations, genes, etc.
Y/N	EC Methods
Y/N	genetic algorithms
Y/N	genetic programming
Y/N	evolutionary programming
Y	evolution strategies
Y/N	grammatical evolution
N	cultural evolution
N	Artificial Life
N	Neuroevolution
N	Weight Evolution
N	Topology Evolution
N	Learning Rule Evolution
N	Combinations
N	ANNs in Alife
Y	Evolutionary Robotics

Natural Computing Algorithms

Anthony Brabazon, Michael O'Neill, and Seán McGarraghy

554 pages, Springer, 2015, free PDF available

<https://link-springer-com.ezproxy.lib.ou.edu/book/10.1007/978-3-662-43631-8>

Strengths

- ??

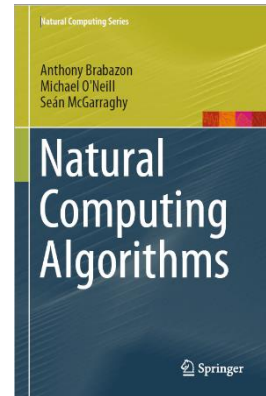
Weaknesses

- ??

Coverage Score: 16.5

Verdict: **Probably reasonable as General Main Text**

This book is a generally strong contender as a general textbook covering all major topics for the course, although some of the coverage seems somewhat weak/incomplete in places (e.g., no RL, no deep ANNs).



Covered	Topic
Y/N	<i>Computational Intelligence</i>
Y/N	Information Representation
Y	functions
Y/N	time series
Y	classes
Y	clusters
N	policies
Y/N	Learning
Y	supervised learning
Y	unsupervised learning
N	reinforcement learning
Y/N	<i>Artificial Neural Networks</i>
Y	Fundamentals
Y	biological inspiration
Y	neural computational elements
Y/N	Topologies
Y	feedforward
Y	laterally connected
Y/N	recurrent
N	deep
Y/N	Learning
Y	supervised learning
Y	unsupervised learning
N	reinforcement learning
Y/N	<i>Evolutionary Computation</i>
Y	Fundamentals
Y	biological inspiration
Y	populations, genes, etc.
Y/N	EC Methods
Y	genetic algorithms
Y	genetic programming
Y	evolutionary programming
Y	evolution strategies
Y	grammatical evolution
Y/N	cultural evolution
N	Artificial Life
Y/N	Neuroevolution
Y	Weight Evolution
Y	Topology Evolution
N	Learning Rule Evolution
Y/N	Combinations
N	ANNs in Alife
N	Evolutionary Robotics

Computational Intelligence: Methods & Techniques

Leszek Rutkowski

519 pages, Springer, 2008 (English), 2005 (Polish), free PDF available

<https://link-springer-com.ezproxy.lib.ou.edu/book/10.1007/978-3-540-76288-1>

Strengths

- ??

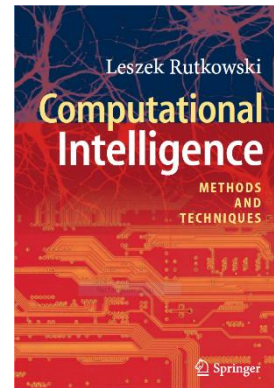
Weaknesses

- ??

Coverage Score: 16

Verdict: **Probably somewhat reasonable as General Main Text**

This book is a generally reasonable contender as a general textbook covering most major topics for the course. However, it is missing a general overview of CI. Also, it is getting rather dated (note that the only changes from 2005 to 2008 were the translation).



Covered	Topic
N	<i>Computational Intelligence</i>
N	Information Representation
N	functions
N	time series
N	classes
N	clusters
N	policies
N	Learning
N	supervised learning
N	unsupervised learning
N	reinforcement learning
Y/N	<i>Artificial Neural Networks</i>
Y	Fundamentals
Y	biological inspiration
Y	neural computational elements
Y/N	Topologies
Y	feedforward
Y	laterally connected
Y	recurrent
N	deep
Y/N	Learning
Y	supervised learning
Y	unsupervised learning
N	reinforcement learning
Y/N	<i>Evolutionary Computation</i>
Y	Fundamentals
Y	biological inspiration
Y	populations, genes, etc.
Y/N	EC Methods
Y	genetic algorithms
Y	genetic programming
Y	evolutionary programming
Y	evolution strategies
N	grammatical evolution
N	cultural evolution
y	Artificial Life
Y/N	Neuroevolution
Y	Weight Evolution
Y	Topology Evolution
N	Learning Rule Evolution
Y/N	Combinations
N	ANNs in Alife
N	Evolutionary Robotics

Introduction to Evolutionary Computing, Second Edition

A.E. Eiben and J.E. Smith

294 pages, Springer, 2015, free PDF available

<https://link-springer-com.ezproxy.lib.ou.edu/book/10.1007/978-3-662-44874-8>

Strengths

- ??

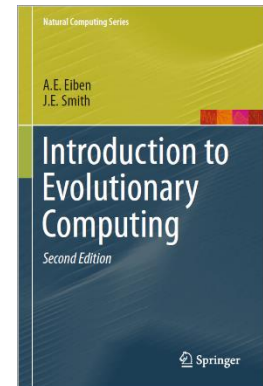
Weaknesses

- ??

Coverage Score: 9

Verdict: **Reasonable for coverage of EC only**

This book looks like a good book for EC but nothing else. Could be one of a combination of books.



Covered	Topic
N	<i>Computational Intelligence</i>
N	Information Representation
N	functions
N	time series
N	classes
N	clusters
N	policies
N	Learning
N	supervised learning
N	unsupervised learning
N	reinforcement learning
N	<i>Artificial Neural Networks</i>
N	Fundamentals
N	biological inspiration
N	neural computational elements
N	Topologies
N	feedforward
N	laterally connected
N	recurrent
N	deep
N	Learning
N	supervised learning
N	unsupervised learning
N	reinforcement learning
Y	<i>Evolutionary Computation</i>
Y	Fundamentals
Y	biological inspiration
Y	populations, genes, etc.
Y	EC Methods
Y	genetic algorithms
Y	genetic programming
Y	evolutionary programming
Y	evolution strategies
N	grammatical evolution
N	cultural evolution
N	Artificial Life
N	Neuroevolution
N	Weight Evolution
N	Topology Evolution
N	Learning Rule Evolution
N	Combinations
N	ANNs in Alife
Y	Evolutionary Robotics

Template Title

Template Author(s)

__ pages, Publisher, year, cost/PDF availability

URL

Strengths

- ??

Weaknesses

- ??

Coverage Score: ??

Covered Topic

Computational Intelligence

Information Representation

functions

time series

classes

clusters

policies

Learning

supervised learning

unsupervised learning

reinforcement learning

Artificial Neural Networks

Fundamentals

biological inspiration

neural computational elements

Topologies

feedforward

laterally connected

recurrent

deep

Learning

supervised learning

unsupervised learning

reinforcement learning

Evolutionary Computation

Fundamentals

biological inspiration

populations, genes, etc.

EC Methods

genetic algorithms

genetic programming

evolutionary programming

evolution strategies

grammatical evolution

cultural evolution

Artificial Life

Neuroevolution

Weight Evolution

Topology Evolution

Learning Rule Evolution

Combinations

ANNs in Alife

Evolutionary Robotics