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Elements in Quantitative Finance
edited by
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EDHEC Business School

MACHINE LEARNING FOR ASSET MANAGERS

Marcos M. López de Prado
Cornell University

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University Printing House, Cambridge CB2 8BS, United Kingdom

One Liberty Plaza, 20th Floor, New York, NY 10006, USA

477 Williamstown Road, Port Melbourne, VIC 3207, Australia

314–321, 3rd Floor, Plot 3, Splendor Forum, Jasola District Centre,
New Delhi – 110025, India

79 Anson Road, #06–04/06, Singapore 079906

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www.cambridge.org
Information on this title: www.cambridge.org/9781108792899
DOI: 10.1017/9781108883658

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First published 2020

A catalogue record for this publication is available from the British Library.

ISBN 978-1-108-79289-9 Paperback
ISSN 2631-8571 (online)
ISSN 2631-8563 (print)

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DOI: 10.1017/9781108883658
First published online: April 2020

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Abstract: Successful investment strategies are specific implementations of general theories. An investment strategy that lacks a theoretical justification is likely to be false. Hence, an asset manager should concentrate her efforts on developing a theory rather than on backtesting potential trading rules. The purpose of this Element is to introduce machine learning (ML) tools that can help asset managers discover economic and financial theories. ML is not a black box, and it does not necessarily overfit. ML tools complement rather than replace the classical statistical methods. Some of ML's strengths include: (1) a focus on out-of-sample predictability instead of in-sample variance adjudication; (2) the use of computational methods to avoid relying on (potentially unrealistic) assumptions; (3) the ability to "learn" complex specifications, including nonlinear, hierarchical, and noncontinuous interaction effects in a high-dimensional space; and (4) the ability to disentangle the variable search from the specification search, in a manner that is robust to multicollinearity and other substitution effects.

Keywords: machine learning, unsupervised learning, supervised learning, clustering, classification, labeling, portfolio construction

JEL classifications: G0, G1, G2, G15, G24, E44
AMS classifications: 91G10, 91G60, 91G70, 62C, 60E

© True Positive Technologies, LP 2020
ISBNs: 9781108792899 (PB), 9781108883658 (OC)
ISSNs: 2631-8571 (online), 2631-8563 (print)

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