

SPRINGER BRIEFS IN BUSINESS

Rajendra Akerkar

Artificial Intelligence for Business



Springer

SpringerBriefs in Business

More information about this series at <http://www.springer.com/series/8860>

Rajendra Akerkar

Artificial Intelligence for Business

 Springer

Rajendra Akerkar
Western Norway Research Institute
Sogndal, Norway

ISSN 2191-5482 ISSN 2191-5490 (electronic)
SpringerBriefs in Business
ISBN 978-3-319-97435-4 ISBN 978-3-319-97436-1 (eBook)
<https://doi.org/10.1007/978-3-319-97436-1>

Library of Congress Control Number: 2018950441

© The Author(s), under exclusive license to Springer International Publishing AG, part of Springer Nature 2019

This work is subject to copyright. All rights are reserved by the Publisher, whether the whole or part of the material is concerned, specifically the rights of translation, reprinting, reuse of illustrations, recitation, broadcasting, reproduction on microfilms or in any other physical way, and transmission or information storage and retrieval, electronic adaptation, computer software, or by similar or dissimilar methodology now known or hereafter developed.

The use of general descriptive names, registered names, trademarks, service marks, etc. in this publication does not imply, even in the absence of a specific statement, that such names are exempt from the relevant protective laws and regulations and therefore free for general use.

The publisher, the authors, and the editors are safe to assume that the advice and information in this book are believed to be true and accurate at the date of publication. Neither the publisher nor the authors or the editors give a warranty, express or implied, with respect to the material contained herein or for any errors or omissions that may have been made. The publisher remains neutral with regard to jurisdictional claims in published maps and institutional affiliations.

This Springer imprint is published by the registered company Springer Nature Switzerland AG
The registered company address is: Gewerbestrasse 11, 6330 Cham, Switzerland

Preface

Artificial intelligence (AI) has become a prominent business buzzword. However, many organizations continue to fail to effectively apply AI to solve specific business cases. An important characteristic of AI is that it is not static, it learns and adapts.

Artificial intelligence is the creation of “intelligent” machines – intelligent because they are taught to work, react and understand language like humans do. If you have ever used predictive search on Google, asked Siri about the weather, or requested that Alexa play your special playlist, then you have experienced AI. AI will positively and immensely change how we engage with the world around us. It is going to advance not only how business is done but the kind of work we do – and unleash new heights of creativity and inventiveness.

For businesses, the practice of AI translates straight into less time spent on routine administrative tasks internally and satisfied customers externally. Adopting AI can be cost-effective, complementary to customer engagement and useful in bridging talent gaps.

Far from merely eliminating repetitive tasks, AI should put people at the centre, augmenting the workforce by applying the capabilities of machines subsequently people can focus on higher-value analysis, decision making and innovation.

The business adoption of AI is at a very early stage but growing at a significant rate. AI is steadily passing into everyday business use. From workflow management to trend predictions and from customer service to dynamic price optimization, AI has many different usages in business. AI also offers innovative business opportunities. The AI technologies are critical in bringing about innovation, providing new business models and reshaping the way businesses operate.

This book explains in a lucid and straightforward way how AI techniques are useful in business and what we can accomplish with them. The book does not give thorough attention to all AI models and algorithms but gives an overview of the most popular and frequently used models in business.

The book is organized in six sections.

Section 1 provides a brief introduction to artificial intelligence – presents a basic concept of AI and describes its relationship with machine learning, data science and big data analytics. The section also presents other related issues.

Section 2 presents core machine learning – workflow and the most effective machine learning techniques. Machine learning is the process of teaching a computer system how to make accurate predictions when fed data. Those predictions could be answering whether a piece of fruit in a photo is a mango or an orange, spotting people crossing the road in front of a self-driving car, whether the use of the word book in a sentence relates to a paperback or a table reservation in restaurant or recognizing speech exactly to generate captions for a YouTube video.

Section 3 deals with deep learning – a common technique for developing AI applications. It is suitable for training on very large and often unstructured historical data sets of inputs and outputs. Then, specified a new input, predicting the most likely output. It is a simple intelligence method, but one which can be applied across almost every function inside a business.

Section 4 introduces recommendation engines – one of the concepts in AI has gained momentum. It is a perfect marketer tool particularly for online businesses and is very useful to increase turn around. Recommendation engine is seen as an intelligent and sophisticated salesman who knows the customer taste and style and thus can make more smart decisions about what recommendations would benefit the customer most thus increasing the possibility of a conversion. Though it started off in e-commerce, it is now gaining popularity in other sectors, including Media. The section will focus on learning to use recommendation engines for businesses to be more competitive and consumers to be more efficient.

Section 5 presents a primer on natural language processing (NLP) – a technique that gives machines the ability to read, understand and derive meaning from the human languages. Businesses are turning to NLP technology to derive understanding from the enormous amount of unstructured data available online and in call logs. The section also explores NLP for sentiment analysis focused on emotions. With the help of sentiment analysis, businesses can understand their customers better to improve their experience, which will help the businesses change their market position.

Section 6 deals with observations and insight – on employing AI solutions in business. Without finding a problem to solve, business will not gain the desired benefits when employing AI. If they are looking for a solution to detect anomalies, predict an event or outcome, or optimize a procedure or practice, then they potentially have a problem AI can address. The section begins with unfolding analytics landscape and describes how to embed AI in business processes. The section states potential business prospects of AI and the benefits that companies can realize by implementing AI in their processes.

The target audience of this informative SpringerBriefs is business students and professionals interested in AI applications in data-driven business. The book is also valuable for managers who would like to make their current processes more efficient without having to dig too deep into the technology, and executives who want to use AI to obtain a competitive advantage over their competitors.

I am grateful to many friends, colleagues and collaborators who have helped me as I have learned and taught about artificial intelligence. Particularly, I want to thank

Minsung Hong for his help in drawing figures. I thank Matthew Amboy and Springer team, who helped in book editing and production. I could not have done it without the help of these people. Finally, I must thank my family: Rupali and Shreeram for their encouragement and support.

Sogndal, Norway

Rajendra Akerkar

Contents

- Introduction to Artificial Intelligence** 1
 - Data 1
 - Information 2
 - Knowledge 2
 - Intelligence 3
 - Basic Concepts of Artificial Intelligence 3
 - Benefits of AI 6
 - Data Pyramid 6
 - Property of Autonomy 8
 - Situation Awareness 9
 - Business Innovation with Big Data and Artificial Intelligence. 10
 - Overlapping of Artificial Intelligence with Other Fields 11
 - Ethics and Privacy Issues 13
 - AI and Predictive Analytics 14
 - Application Areas 15
 - Clustering or Segmentation. 16
 - Psychographic Personas 18
- Machine Learning**. 19
 - Introduction. 19
 - Machine Learning Workflow 21
 - Learning Algorithms 22
 - Linear Regression 22
 - k*-Nearest Neighbour 23
 - Decision Trees. 24
 - Feature Construction and Data Reduction 26
 - Random Forest 26
 - k*-Means Algorithm 26
 - Dimensionality Reduction 28
 - Reinforcement Learning 28
 - Gradient Boosting 29
 - Neural Networks 30

Deep Learning	33
Introduction	33
Analysing Big Data	34
Different Deep Learning Models	36
Autoencoders	36
Deep Belief Net	36
Convolutional Neural Networks	37
Recurrent Neural Networks	37
Reinforcement Learning to Neural Networks	38
Applications of Deep Learning in Business	38
Business Use Case Example: Deep Learning for e-Commerce	39
Recommendation Engines	41
Introduction	41
Recommendation System Techniques	44
Content-Based Recommendations	44
Collaborative Recommendations	46
Hybrid Approaches	47
Applications of Recommendation Engines in Business	47
Collection of Data	48
Storing the Data	49
Analysing the Data	49
Business Use Case	51
Natural Language Processing	53
Introduction	53
Morphological Processing	55
Syntax and Semantics	55
Semantics and Pragmatics	55
Use Cases of NLP	56
Text Analytics	57
Sentiment Analysis	58
Applications of NLP in Business	59
Customer Service	59
Reputation Monitoring	60
Market Intelligence	61
Sentiment Technology in Business	61
Employing AI in Business	63
Analytics Landscape	63
Application Areas	64
Complexity of Analytics	64
Embedding AI into Business Processes	70
Implementation and Action	72