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Parag Kulkarni

Reverse Hypothesis Machine Learning

A Practitioner's Perspective

Springer

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To all data scientists and machine learning experts who did not get carried away by terminologies and dared to innovate knowledge

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Author's Note

Why this new book? What is reverse hypothesis machine? And what is relationship between ML and knowledge innovation?—are some questions that immediately surface after reading this title. In fact, this book is outcome of research and thought process blended with applications and research about innovative thinking. After writing books "Knowledge Innovation Strategy" and "Reinforcement and Systemic Machine Learning", I delivered numerous talks. These talks explained the relationship between knowledge innovation and machine learning. These talks were appreciated by many critics. Critical clients also welcomed machine learning products developed using some of these concepts. That kept us motivated to explore more, and research beyond. While working on ML solutions with our clients and building some interesting products, we tried different aspects of machine learning based on knowledge innovation. This led to concept of *Reverse Hypothesis Machine*. When I have decided to write this book—there was a thought of bringing our experience at iknowlation in the form of an interesting journey and insightful thought processes.

After working with advance technologies, deep learning, and different intelligent applications, we focused on solving customer problems through our solutions. While working closely with many organizations, with the thirst for developing cutting-edge applications, many new issues surfaced. Issues ranged from technology selection, model selection to data and feature engineering. There were some other issues like handling some interesting creative tasks and getting more out of traditional algorithms. Some clients wanted to come up with interesting solutions based on iknowlation products. These issues motivated us to research and we began to address them in our own way. In some cases these ways succeeded while in other cases these ways led to a few more ways of doing it. The journey went on like that. Well, I should say once again this book is about journey. This journey began with simple consultation to research-oriented organizations and resulted in allowing us to apply our patented ML models for them. During this journey many questions like—do we really need huge data? Is too much context is detrimental? Is learning is only mapping input and output?—kept on pushing us. These questions are difficult to answer. Hence those questions kept chasing our wonderful passionate team. Are today's systems really contextually intelligent? Can they solve problems? This book is an attempt to unfold answers of these strategically and technically very important and extremely relevant questions. While delivering a talk at

Vishakhapatnam, Mr. Lakhmi C. Jain approached me and requested me to write a book on this concept. His obvious reason was no one has seen the practical application and possibilities of new paradigms from knowledge innovation perspective. Many thanks to Mr. Lakhmi C. Jain, the journey began. It continued with interaction with my clients, it continued with research, it continued with some of the most difficult implementations, and resulted as an outcome in the form of this book.

I know that it is always difficult to find golden mean between philosophy and technical machine learning. As machine learning connoisseurs think—ML is now ready to conquer the world. It is probably the most vibrant field with applications in unlimited verticals. It made us to rethink about our original concept and revisit our thought process.

Machine learning is art and science, it is thinking and application and it is psychology and mathematics. Hardly any other field has a mix of so many wonderful areas of science and technology combined. This book takes a fresh look at this vibrant area from the perspective of knowledge innovation. Knowledge innovation is beyond knowledge acquisition, it is optimally handling limited data and it is coming up with surprises through ability to innovate already acquired knowledge. I think this machine learning journey on knowledge innovation wheels bathed in a fresh perspective will bring delight to readers, researchers, and ML professionals. Every professional who directly or indirectly related to machine learning will find something interesting from this book to march toward pinnacle of his/her ML career. So tighten your seat belt to take off to creative machine learning journey…

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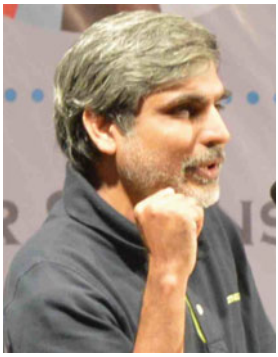

Parag Kulkarni, Ph.D., D.Sc. is an entrepreneur, a machine learning researcher, and an author of best-selling innovation strategy and data science books. An avid reader, Parag is founder, CEO, and Chief Scientist of iknowlation Research Labs—a vibrant machine learning product, research and consulting company. iknowlation has over half dozen products built around concepts of associative and systemic machine learning. Parag has published over 300 research papers, owns over a dozen patents and he has authored 14 books. Parag has guided 15 Ph.D. candidates. Parag's machine learning ideas resulted in pioneering products that became commercially successful and produced unprecedented impact. As a consultant, Parag has contributed to success of over two dozen organizations including start-ups and established companies. He is pioneer of concepts systemic machine learning, context vector machines, and deep explorative machine learning. He delivered over 400 keynote addresses and 200+ tutorials across the globe. Parag holds Ph.D. from IIT, Management Education from IIM, and was conferred higher doctorate DSc by UGSM Monarch, Switzerland. His work on systemic machine learning published by IEEE is widely cited. Over 100 institutes and 10,000+ professionals benefitted from Parag's talks, research, and systemic consultation. Fellow of the IET, IETE, Senior member of IEEE, Parag is recipient of Oriental Foundation Scholarship and was nominated for prestigious Bhatnagar award in 2013 and 2014. His areas of interest include machine learning and allied areas

with a focus on optimal and systemic learning. He has been helping organizations in identifying right innovation and machine learning opportunities, building ML models, and embedding creative machine learning in their operations.