Artificial Intelligence Based Expert Systems for Prediction of Tennis Elbow Injury

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*Dedicated to my **Daughter***

***Samayra,**"My Daughter is Face*

of Future World"

Special Thanks to ***my Grandpa for***

cultivating morals and ethics in me

To my ***Mother,*** *You are the most*

beautiful memory I kept locked inside

my heart

To ***my family and friends,*** *for the joys of my life*

Preface

As technology advances, our understanding of the human body and its vulnerabilities grows. One area where this is particularly relevant is in sports injuries, where athletes often face the risk of overuse and strain. Tennis elbow, a common affliction among tennis players and others who engage in repetitive arm motions, is a prime example.

In this book, we explore a fascinating intersection between two fields: artificial intelligence (AI) and sports medicine. Specifically, we delve into the realm of expert systems, which are AI-driven tools designed to mimic the decision-making abilities of human experts.

But fear not if you're not a tech whiz or a medical professional – this book is written with you in mind. We'll take you on a journey through the world of tennis elbow injuries, explaining complex concepts in simple terms and illustrating how AI can be harnessed to predict and prevent such injuries.

Imagine having a virtual coach who can analyze your movements, assess your risk factors, and offer personalized advice to keep you injury-free. That's the promise of AI-based expert systems, and it's a promise we explore in depth in the pages that follow.

Whether you're a tennis enthusiast, a fitness buff, or simply curious about the ways in which technology is shaping the future of healthcare, this book has something for you. So, join us as we embark on a quest to leverage the power of AI for the betterment of athletes everywhere.

Acknowledgement

I would not be able to get my work done without continuing support of Dr.Himanshu K Patel, Head Electronics & Instrumentation Engineering Department, and Nirma University Gujarat-India and Dr.Achyut Trivedi, Chairperson ,Centre of Excellence for additive Manufacturing, Ganpat University Gujarat-India. I would like to thank the contributors and editors who have spent numerous hours in the review of this text and sharing their expertise. I would like to express my special thanks of gratitude to Dr.Rajendra N Solanki MD FICR, Professor & Head Nootan Medical College, Visnagar Gujarat-India and Consultant Radiologist, Suyog Imaging, Mehsana & Radiscan Diagnostics, Ahmedabad Gujarat-India for providing Data and Knowledge about tennis elbow. I would like to Thank Mr. Arpan Trivedi (Certified Tennis coach) for being the inspiration and foundation for selection of the title regarding my passion Tennis. Thanks to every one of my publishing team.

Prof. Heena K Patel

My sense of accomplishment would be partial, if I don't mention everyone who helped, in one way or another, during the entire period of this book. The brevity of this acknowledgement does not in any way downplay the support I have received from anyone mentioned, or not mentioned, herein. I am beholden to Institute of Technology, Nirma University, wherein I realize my ardour for teaching. My special thanks to Nirma University management for the unmatched support. I am thankful to my friends and students as well.

I owe everything to my parents and family for their absolute care and love. My love and thanks to one and all for helping me to create a life so full of interest, so full of dreams and so rich in meetings with Life itself.

Dr. Himanshu Patel

About the Authors

Prof. Heena Patel is working as the Assistant Professor in Biomedical Engineering Department, U.V.Patel College of engineering-Ganpat University. She has an experience of more than 16 years in the field of academics and Research. She obtained her B.E in Biomedical Engineering from Hemchandracharya North Gujarat University in 2006 and M.E in Instrumentation Engineering in 2010 from Dharmsinh Desai University. She is a Ph.D scholar in Nirma University and pursuing her Ph.D in Biomedical and Instrumentation Engineering. She is associated with Biomedical Engineering field since 2006. She is also a data scientist.She is also associated with different International professional bodies like ISA (International society of automation), AATC(Australasian academy of tennis association) and ICF(International camp fellowship).She is a tennis player and won many district level tennis tournaments. She has published more than 15 research papers in the area of Sports Biomechanics, Artificial Neutral networks, biomedical engineering, Artificial Intelligence, Prosthetics and orthotics etc. She is a Biomechanics specialist in women coaches of India association.She is also certified tennis coach level II. She has been invited as expert by Russian summer camp association for conference in Russia to share her expertise of biomechanics and AI for children's recreation activities and sports biomechanics.

She is a faculty advisor of ISA (International society of automation) Student Chapter Ganpat University.

Dr. Himanshu Patel is working as the Head and Associate Professor of Electronics and Instrumentation Engineering Department, School of Technology, Institute of Technology, Nirma University. He has an experience of more than 26 years in the field of Academics, Research and Industry. He obtained his BE in Instrumentation and Control Engineering from Gujarat University in 1993 and MTech in Electrical Engineering from Nirma University in 2005. Dr Patel obtained his Ph D from Kadi Sarva Vishwavidyalaya in 2018. He is associated with the Department since January 2000. Dr Patel has 5 books published with the publishers of International repute to his credit. He has published more than 20 research papers in the area of Industrial Electronics, Biomedical Instrumentation, Sensors and Measurement techniques etc. in International referred Journals and presented 30+ papers in International Conferences. He is guiding 5 PhD students. Dr Patel has received many prestigious awards including Three International Awards form International Society of Automation (ISA) namely, "Excellence in Education Award" (2020), "Section Leader of the Year Award" (2018) and "Distinguished Society Service Award" (2016). Dr Patel is a Senior Member of International Society of Automation (ISA) since 2011 and is recently appointed as the Chair - Student Affairs for ISA District'14 (Asia-Pacific). He is also having the life membership of ISTE and ACEEE. Dr Patel is serving as the Expert Reviewer for the Advance Research Grant programme at Puerto Rico Science, Technology and Research Trust, Puerto Rico. Dr Patel is a reviewer of several international refereed journals in the field of Sensors, Measurement Techniques, Power Electronics, Industrial Instrumentation and Biomedical Instrumentation.

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ABOUT THE BOOK

Tennis elbow can be a real pain, quite literally! It's a common problem for tennis players and others who use their arms a lot. But what if there was a way to predict when it might happen and even prevent it?

That's what this book is all about. It's like having a smart friend who knows a lot about both tennis and computers. We're exploring how artificial intelligence, which is like a super-smart computer brain, can help us predict when someone might get tennis elbow.

We'll dive into the world of expert systems, which are like digital experts that can look at lots of data and give us really good advice. With the help of these expert systems, we can learn more about why tennis elbow happens and how to stop it from ruining our game.

Even if you're not a tennis player, you'll find plenty of interesting stuff here. We'll break down complicated ideas into simple ones so everyone can understand. So, if you're curious about how technology and sports mix together, this book is for you!

Get ready to explore the exciting world of artificial intelligence and tennis elbow prediction. Let's dive in and learn how we can use technology to keep athletes swinging strong!

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