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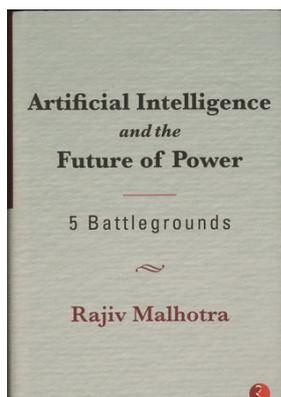


Stability of India Rankings

Sandalwood plantations

Fluorosis related health hazard in Rarh Bengal

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Artificial Intelligence and the Future of Power: 5 Battlegrounds. Rajiv Malhotra. Rupa Publications India Pvt Ltd, 7/16, Ansari Road, Daryaganj, New Delhi 110 002. 2021. 520 pages. Price: Rs 795.

Rajiv Malhotra is an author of great intensity, intellectual scholarship, contemporary wisdom and supreme patriotism. His books are hard hitting commentaries on dangers lurking behind to weaken India's position in the global order. In this most recent book, Malhotra picks the most talked about technology of Artificial Intelligence (AI) (and other modern technologies) and imaginatively portrays five battlegrounds which India should be aware of, if it wishes to pursue an ambitious course to attain global leadership in AI and harness it towards creating wealth and welfare for the nation. This scholarly and deeply researched book takes a much-needed *devil's advocate approach* to make powerful points and succeeds in communicating its message through a gripping narrative. Himself a distinguished expert in physics and computer science, Malhotra lends excellent credibility to the book with his impeccable command over the issues addressed in the book.

Malhotra uses the phrase Artificial Intelligence to refer to a whole gamut of modern technologies sweeping across the globe: machine learning, big data analytics, data science, quantum computing, semiconductor technologies, nanotechnology, neuromorphic computing, robotics, 5G, smart manufacturing, and the like. He acknowledges these are distinct but AI brings them together in ways that give them a greater collective power.

The book has two parts to it: (1) Algorithm versus Being, (2) Battleground for India. Four battlegrounds are discussed in part 1: (a) The battle for jobs (chapter

2), (b) The battle for world domination (chapter 3), (c) The battle for agency (chapter 4), (d) The battle for self (chapter 5). The final battle 'The battle for India' constitutes part 2 of the book which comprises chapters 6 to 10.

Before launching compelling arguments for each battleground, Malhotra provides an excellent overview of AI technologies in chapter 1; he first discusses fundamental advances such as machine learning, data analytics, and AI gadgets. Next he discusses AI applications ranging from healthcare and agriculture to education, military and financial services. Then, he touches upon the controversial issues surrounding AI such as (un)fairness, (lack of) accountability, (lack of) transparency, and (questionable) ethics. The remarkable aspect of chapter 1 is its ready accessibility to non-technical audience who have no familiarity with AI. This is a striking aspect of the entire book.

Malhotra's main argument is that AI has disrupted the equilibrium that existed in the global order in (1) economic development and jobs; (2) power and influence of nations; (3) human psychology; and (4) metaphysics. He calls each of these *battlegrounds*. The author sketches out these battlefields in a systematic and comprehensive way, with an eye on every single detail. These battlegrounds have always existed but they were operating under a delicate equilibrium. AI has changed the game dramatically and the equilibrium is being dislodged leading to a chaotic state. A new equilibrium will inevitably be established and India has to be fully aware of the forces at play and proactively shape its strategy in a brilliant and deeply technical way and invest massive resources to emerge as a leading global player. Countries like China and USA are furiously competing to shaping the new equilibrium and India may be left behind in a miserable way if it does not get its act together in a super-fast mode.

The book raises and deliberates upon many fundamental questions:

- There is a high probability that AI could trigger an unprecedented level of unemployment leading to social divide and instability, especially in a highly populous nation like India. How will India survive this tsunami which has already started hitting the country?

- With some countries investing massive resources into AI and modern technologies, will India be left far behind in the race despite its vast pool of young talent and how can this looming crisis be tackled?
- AI has started influencing human preferences, human emotions and human behaviour by accessing private data of individuals by offering popular and widely used services. Will this lead us to become slaves of technology with the control being transferred completely to technology giants?
- Will AI lead to 'digital dehumanisation' by undermining the human concepts of free will and creativity in favour of artificially induced experiences?

The above questions may appear to be hyperbolic but Malhotra presents them with deeply logical arguments and these questions cannot be dismissed at all. They are indeed questions that need to be debated fiercely, widely and scientifically to obtain a clear resolution and plan of action.

The author is at his best in part 2 where he touches upon all issues underlying the battleground for India. He is really concerned that overpopulation, unemployment and poor education will make India especially vulnerable in the near future when technology giants will launch an onslaught to take control. Many of India's industries still rely on and are over dependent on old and imported technologies. The developments in AI in India are subcritical and do not do justice to India's vast potential. India is seriously lagging behind USA and China in AI by at least a decade and the country is giving away its precious data assets to foreign countries. If the present trend continues, India will be left far behind and will find it impossible to catch up in the foreseeable future. The author even goes on to say that India could well end up as a 'digital colony' under the domination of AI superpowers like USA and China. The author exhorts India to wake up, scale up and move brilliantly to become a global superpower in AI.

This little book review captures only briefly the spirit of this superb and power-packed offering from Malhotra. The book is timed perfectly – it raises technical, tactical, operational and strategic issues in nurturing AI and emerging technologies

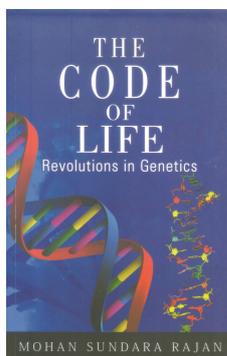
BOOK REVIEWS

in modern India. The book may appear to paint ominous signs for India's future and may sound too pessimistic about India but the arguments and underlying logic are powerful with facts and figures and excellent analysis. Words such as battle ground, digital colony, recolonization, etc. may appear too strong but the fact is that India has been mostly reactive and not proactive in the wake of the fast changing equations in the AI space.

This thought-provoking book is eminently accessible to everyone: technical experts in AI, non-technical readers who have no knowledge whatever of the emerging technology landscape, students, general public, bureaucrats and policy makers. In my humble opinion, this book is a must read for every Indian concerned about India's future in the wake of the rise and rise of AI and related technologies.

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The Code of Life: Revolutions in Genetics. Mohan Sundara Rajan. National Book Trust, India, Nehru Bhawan, 5, Institutional Area, Phase-II, Vasant Kunj, New Delhi 110 070. 2020. xiv + 275 pages. Price: Rs 270.

The book under review by Mohan Sundara Rajan can be viewed as a beginner's

introduction to the origins of genetics, genetic inheritance and advances in genome engineering. The first chapter titled 'An ever changing draft' sets the tone for the reader: that the genome is not a 'fixed' entity; it has been changing over millennia and will continue to do so. The chapter traces the 'Timeline' and lists some of the important developments that have contributed to the understanding of genetic inheritance till date including the deciphering of the structure of DNA, the genetic code. In the subsequent chapters, many other aspects of DNA that contribute to inheritance are discussed including the role of 'junk DNA' and, importantly, epigenetics in inheritance.

The latter half of the book mainly discusses the recent technological advances that have impacted the genetics of inheritance. The discovery of CRISPR based editing, its mechanism of action and applications are discussed in different contexts. Importantly, the ethical issues surrounding the use of CRISPR are discussed at length. The use of stem cells and stem cell technology in the treatment of neurodegenerative disorders, organ failures, use of CRISPR coupled with stem cell technology to 'fix' disease causing genes in embryos are explained simply. The book ends with a discussion on genetic variability in the Indian sub-continent and Southeast Asia; the DNA database in India and Indian institutions and engaged in genome and genetic research.

The book is impressive in the range of topics it covers, the information and the detail. It is clear that it is well researched. Beginning with the ideas of inheritance and Mendel's laws, the book goes on to discuss CRISPR-Cas9 – the latest in genome engineering. It goes a step further to also discuss the ethical issues and dangers surrounding the use of this technology. The book is almost modular in its organization in that each chapter can be read as an independent essay. The language is simple and easy to comprehend. What adds to making the



A Harvard University team has designed an *Escherichia coli* genome with only 57 codons (out of a total 64) replacing the others. The re-coded genome design had 62,214 codon replacements across 3,548 genes. The seven blank codons can be reintegrated and used to introduce non-standard amino acids. Courtesy: Harvard University.

read interesting are the little snippets of information placed in boxes and stories surrounding major discoveries, which highlights the often serendipitous nature of discoveries in science.

The book falters a little in the last few chapters where many of recent advances in the interface of biology and computer science are discussed. The coherence of the earlier chapters is not visible in this section. The lack of a bibliography is another drawback, the presence of which would have enabled reader to refer to the original papers for more in-depth learning. Nonetheless, the book does well in simplifying the science of genes and inheritance, explaining the current advances and their implications for humankind. For both, science and non-science students this book will be a valuable resource of information.

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