

See discussions, stats, and author profiles for this publication at: <https://www.researchgate.net/publication/362198525>

ARTIFICIAL INTELLIGENCE IN PRODUCT MANAGEMENT: SYSTEMATIC REVIEW

Article · July 2022

CITATIONS

16

READS

5,052

3 authors, including:



Noman Mazher

University of Gujrat

51 PUBLICATIONS 271 CITATIONS

[SEE PROFILE](#)



Gopala Krishna Sriram

EdgeSoft Corp

21 PUBLICATIONS 452 CITATIONS

[SEE PROFILE](#)

ARTIFICIAL INTELLIGENCE IN PRODUCT MANAGEMENT: SYSTEMATIC REVIEW

Bharatwaja Namatherdhala*¹, Noman Mazher*²,
Gopal Krishna Sriram*³

*¹Adobe Inc.

*^{2,3}EdgeSoft Crop, USA.

ABSTRACT

Artificial Intelligence (AI) is the most impressive technology of the current era. The current technological globe is incomplete without using Artificial Intelligence and its branches like Machine Learning (ML) and Deep Learning (DL). The technological revolution has been possible by making machines intelligent enough to learn and improve themselves. Along with their involvement in other areas of life, Product Management is a new area that merges with AI. With AI technology, Product Managers have been able to AI products that are the products use AI. This research will reveal the participation of AI and its branches in the Product Management paradigm and the roles and responsibilities of AI product managers.

Keywords: Product Management, Artificial Intelligence, Machine Learning.

I. INTRODUCTION

The current century brings revolutions in technology glob. Modern technologies such as Artificial Intelligence, Machine Learning, Cloud Computing, the Internet of Things, and Blockchain offer numerous digital solutions and play a pivotal role in the customer base[1]. Furthermore, these emergent technologies facilitate business by offering enhanced services for customers. Artificial Intelligence (AI) and Machine Learning (ML) are the most powerful technologies that turn the tables on modern products and services[2]. By definition, AI is the simulation of human intelligence by machines, especially by computer systems, so it can automatically perform human tasks without humans [3]. A common misconception is that AI equals Machine Learning, which is invalid. AI can be a rule-based system where the hard-coded rules, if a, are programmed into the system. There can be tens of thousands of such rules. By chaining all these rules together, such a system can make decisions or take actions on new data without human intervention. The more efficient and flexible way to achieve AI is to use Machine Learning instead of hard coding. In Machine Learning, the rules are just fed historical data into the system and let it learn the rules by itself[4]. First, it is defined how the system should learn by coding an algorithm; then, the algorithms run the data to learn the rules. This learning process is called training, and the training outcome is called a model. Afterward, the model is used for making predictions on new data. There are various machining algorithms, with one subset being deep learning which leverages artificial neural networks to solve more advanced AI problems. Some examples today that are even un noticeably using AI are spam filtering in email boxes, phishing detection, search engines, self-driving cars, and many other areas[5, 6]. All AI systems today are artificial narrow intelligence and night or weak AI. It can only perform a particular set of tasks within a limited context. A product built based on such systems is defined as an AI product, and this product aims to improve human productivity. This research will explore the concept of an AI Product Manager and a product built based on such systems defined as AI products. The goal of this product is to improve human productivity[7]. The rest of this paper is summarized as section II will be discussed AI Product management. Section III role and responsibilities of an AI, the Product Manager, will be discussed. The last conclusion will be presented

II. ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING

This section will discuss the short introduction of AI and its branches, particularly Machine Learning and Deep Learning.

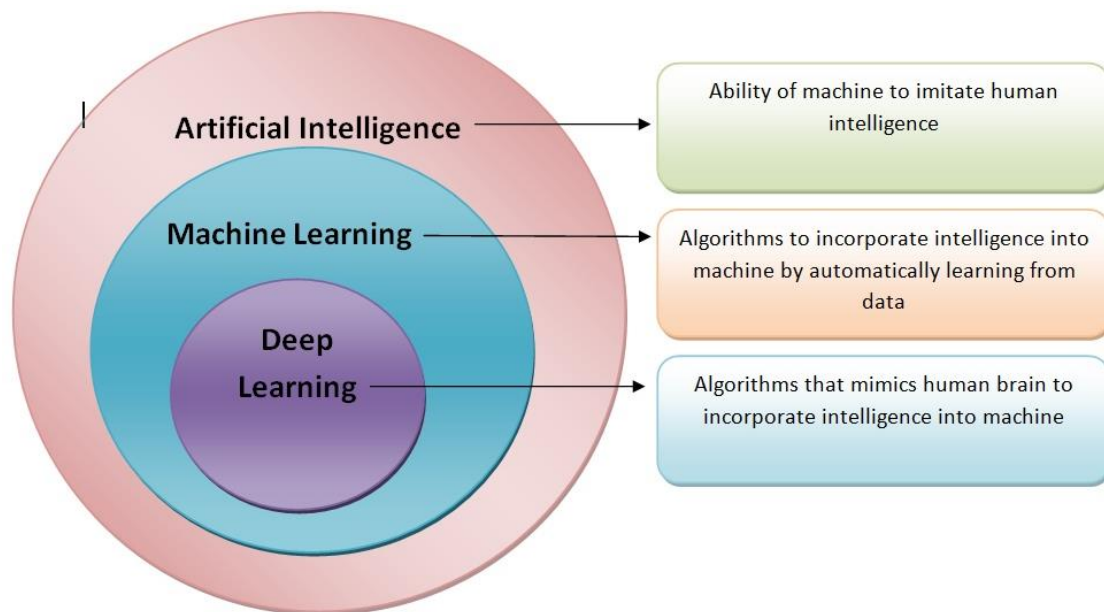


Fig 1: AI and its popular subdomain

Artificial Intelligence:

Artificial Intelligence has been an obsession of human beings for a long time. The term AI was first coined by Allan Turing in 1950 in his question "Can a machine think?". AI has occupied the broad area of the computing domain that attempts to make machines seem like human intelligence. The debate on the definition of AI is very long; in simple words, AI can be defined as a machine's ability to imitate human intelligence. AI is a broad topic that cannot be covered in a short range. AI is used in almost every field of human life, such as autonomous vehicles, cloud computing, the internet of things, bioinformatics, material sciences, and all other domains of science. Product Management is one of the emerging domains that have started leveraging AI benefits to increase the productivity of products.

Machine Learning:

Machine learning is the most famous area of AI that is sometimes considered the whole AI, while this is the domain of AI. Machine learning is the algorithms that incorporate intelligence into the machine by automatically learning from data[8]. Machine Learning algorithms are vast in variety and their uses. The most common categories of ML algorithms are classification and regressions. ML research has started to play a considerable role in Product Management. ML helps Product Managers to create, improve and enhance products to solve real-world problems.

Deep Learning:

Deep Learning can be considered a branch of Machine Learning. The Deep Learning algorithms mimic the human brain to incorporate intelligence into the machine. Deep learning is causing the ML revolution. Deep Learning can be considered a modern reincarnation of Neural Networks that can be thought of as a collection of simple trainable mathematical units organized in layers that work together to solve complex tasks[9]. The best part about Deep Learning is that it can learn features from raw, heterogeneous, noisy data. The famous neural networks are Artificial Neural Networks, Deep Neural Networks, and Convolutional Neural Networks. With the advancement of product design and developments, the above-mentioned neural networks help Product Managers enhance their productivity and problem-solving.

III. AI PRODUCT MANAGEMENT

This section will discuss AI product Management. The first thing that needs to be understood is the specific role of the AI product manager. AI PM's primary responsibility is to understand the most critical business problems that AI can solve[10] since AI is not always appropriate in all situations. AI PM's second important responsibility is identifying and prioritizing the right set of problems. Afterward, develop a vision strategy and roadmap for the steps needed. Lastly, AI PM is responsible of is to make it happen according to the decided strategy. AI

Product management can vary according to their job nature[11]. Table 1 shows the type of product managers and their job responsibilities.

Table 1: Types of AI Product Managers

Type	Job duties
Product	Works on AI boosted products such as web search, self-driving vehicles, AI for ads
Platform	Work on developer tools and infrastructure in order to build AI.
Research	Works on research, working with AI researchers to bring research breakthroughs to production. Typically, these are product managers in more prominent companies where the whole department focuses on research.
Responsible AI	Focus on building AI responsibly

The rest of this section will discuss in detail the roles and responsibilities of the AI Product Manager.

Roles AI Products Manager

This section will discuss what skills are needed to build to become an AI product manager. Since all product managers must determine what the desired outcome, how that outcome will be delivered and how the product will be used before starting the building process. Starting a new process every time is expensive, and it is an investment. Hence at the very beginning phase, AI product managers should be able to use the same rapid innovation tools that design experts use, including (UX) mockups, wireframes, and user surveys. It is critical to frame the problem or the opportunity that the product addresses[7, 12]. ML can solve different categories of problems in their ranking recommendation, such as classification, regression, clustering, and anomaly detection. The AI lifecycle starts from data and training. Data is needed to be trained on ML algorithms discussed above. After training, the design and development phases deal with product development according to the trained model's suggested outcome. Validation and testing are essential for approval for deployment. Finally, AI product managers have to monitor an optimization to ensure that things change even when it's built and out there in the wild. Hence it is essential to monitor the system for quality continuously

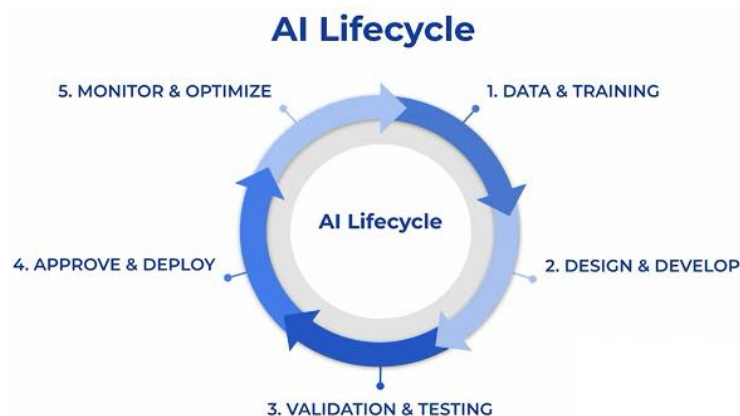


Fig 2: Lifecycle of AI phases.

Responsibilities of AI Product Manager:

This section will discuss the responsibilities of the AI Product Manager since AI is so powerful that it demands additional responsibility that comes with developing such products. For example, in medicine, the Hippocratic oaths state first, not harm. Moreover, AI practitioners should not harm the users and customers as starting points. In other words, unless carefully designed and optimized, AI can cause unintended consequences

Ethical:

AI improves with more data, but data encodes human and social biases. Some examples are facial recognition, which cannot recognize darker-skinned faces. AI unintentionally recommends high-paying jobs to men and low-paying jobs to women. The following are some significant areas of responsibility of AI. AI product

managers have to make sure that AI is fair and it does not have bias so that it is built in a way that's ethical and inclusive

Private and Secure:

It is essential to preserve people's privacy while developing AI to secure against attacks. There are some exciting ways that AI can be tricked. For example, in image recognition, a little bit of manipulation of an image can completely break the algorithm. Hence it is imperative to think about the negative aspects when building AI.

Transparent:

AI should be transparent, so it should be able to understand the why behind the AI and why it makes certain decisions. That is especially important when they are high-stakes use cases that impact people's lives. AI must be accountable, so there must be checks and balances, validation and compliance, and be able to have human oversight.

Reliable:

AI should be reliable, so you have continuous high performance so that the models do not decay. It should detect data issues. That is where monitoring in this pipeline up there is critical.

IV. CONCLUSION

Artificial Intelligence is invading technology that incorporates all sectors of human life. In the current technological world, AI products have been more intelligent and efficient. AI products are not similar to the contrary product in their development and use. Hence AI product demands specific skilled Product Managers. This research aims to discover the involvement of AI in Product Management. The specified role of AI Products Managers has been discussed in this research. The comprehensive overview of AI Product Management can prove a milestone for new researchers in this domain.

V. REFERENCES

- [1] S. Verma, R. Sharma, S. Deb, and D. Maitra, "Artificial intelligence in marketing: Systematic review and future research direction," *International Journal of Information Management Data Insights*, vol. 1, no. 1, p. 100002, 2021.
- [2] R. Ahmad and I. Alsmadi, "Machine learning approaches to IoT security: A systematic literature review," *Internet of Things*, vol. 14, p. 100365, 2021.
- [3] J. C. Newman and R. Oak, "Artificial Intelligence: Ethics in Practice," *login Usenix Mag.*, vol. 45, no. 1, 2020.
- [4] S. Popenici and S. Kerr, "Exploring the impact of artificial intelligence on teaching and learning in higher education," 2017.
- [5] M. Muhammad and G. A. Safdar, "Survey on existing authentication issues for cellular-assisted V2X communication," *Vehicular Communications*, vol. 12, pp. 50-65, 2018.
- [6] N. Mazher, I. Ashraf, and A. Altaf, "Which web browser work best for detecting phishing," in *2013 5th International Conference on Information and Communication Technologies*, 2013: IEEE, pp. 1-5.
- [7] P. I. IT01602790535, "Product & Management," 2014.
- [8] D. Miyamoto, H. Hazeyama, and Y. Kadobayashi, "An evaluation of machine learning-based methods for detection of phishing sites," in *Advances in Neuro-Information Processing*: Springer, 2009, pp. 539-546.
- [9] I. Saidani, A. Ouni, and M. W. Mkaouer, "Improving the prediction of continuous integration build failures using deep learning," *Automated Software Engineering*, vol. 29, no. 1, pp. 1-61, 2022.
- [10] M. N. Kumar and A. Sylendran, "A new approach to product development for AI based firm," 2019.
- [11] D. C. Roach, "The impact of product management on SME performance: Evidence from Canadian firms," *Journal of Small Business and Enterprise Development*, 2011.
- [12] J. Bosch, H. H. Olsson, and I. Crnkovic, "It takes three to tango: Requirement, outcome/data, and AI driven development," in *SiBW*, 2018, pp. 177-192.