iJRASET
International Journal For Research in Applied Science and Engineering Technology



INTERNATIONAL JOURNAL FOR RESEARCH

IN APPLIED SCIENCE & ENGINEERING TECHNOLOGY

Volume: 12 **Issue:** X **Month of publication:** October 2024

DOI: https://doi.org/10.22214/ijraset.2024.64527

www.ijraset.com

Call: 08813907089 | E-mail ID: ijraset@gmail.com

International Journal for Research in Applied Science & Engineering Technology (IJRASET)
ISSN: 2321-9653; IC Value: 45.98; SJ Impact Factor: 7.538
Volume 12 Issue X Oct 2024- Available at www.ijraset.com

Revolutionising Skincare Through Artificial Intelligence

Dayle Salvador Fialho[1], Prof.Mukul Jagtap[2]
Computer Engineering Department, Keystone School of Engineering

Abstract: Background: Over the last 10years there has been a drastic shift in the development of computer-based systems, artificial intelligence, algorithms and technology in the world of dermatology be it cosmetic or even retail production of products sold to customers with high-tech technology and innovative means to build their client base through customer delight. Artificial Intelligence is particularly helpful in recognizing the type of skin customers have and suggesting solutions which help customers pick from the range of options given to them. Most e-commerce platforms have begun using such AI driven soft wear to help customers while they are in the comfort of their homes to choose from a range of cosmetic options right from lipsticks, concealers, foundation, eyeshadows, shades of tins, serums etc. Given that every person has a different skin type, these applications ensure 100 percent personalized suggestions. This new trend is sending shock waves across the retail sector around the world attracting a massive customer base to adapting to AI Derma logy and retail. The intelligent software used by sever companies not only benefits the customer, but also helps companies with their operational efficiency as they can use AI algorithms to predict and forecast the inventory to help reduce over production and excessive stock production minimizing product wastage and improving sustainably.AI is booming in both clinical diagnosis as well as giant companies such as Loreal and Olay who are dedicated to providing customers with advanced tools like skin analyzers or apps based on predefined rules which help AI-powered tools analyze skin conditions, age, and personal skincare history to provide highly personalized product recommendations. In clinical diagnosis AI offers valuable insight to the patient's skin and condition be it cancer or other skin diseases making judgments to assist the doctors and dermatologist in making informed decisions regarding the line of treatment for the patient in question. This includes screening, diagnosis, treatments and predictions of the treatment outcomes. These new innovative and robust AI systems leaving customers feeling confident and have not begun relying on AI driven treatments and procedures.

In this paper I would like to focus on the influence of AI on Cosmetic in the retail sector.

Index Terms: computer-based systems, artificial intelligence, algorithms, technology, personalized, diagnostic, predict, customize, software, Treatments, procedures.

Keywords: Introduction, Methodology, Future Trends, Challenges and Limitations, Conclusion.

I. INTRODUCTION

As per JaKenna Gilbert who is the Nordic Group Digital Director of L'Oréal, Denmark, The COVID- 19 pandemic has a huge impact cross the globe bringing in a shift in commercial and consumer trends keeping in mind the huge drift in consumers becoming more tech savvy and many customers buying beauty products online. Focusing on skin care and beauty products for customers who pay special attention to their daily skin regime. Skin care regime is the method of carrying out various steps to care one's skin daily to ensure the skin is healthy. This routine is crucial and must carried out every day using the correct suitable products. These products need to match the customers skin type and must have the required number of elements to boost the skin health. This is only possible if once can identify their skin type. Latest technology and AI influence has created a huge scope for customers to know their skin better. All companies are working on developing new AI programs to make the skin care analysis even more reliable and fulfilling using advanced technology, algorithms and coding methods to build their soft wear as fitting as possible. One of the giant companies L'Oreal has been encompassed by a record – level of 26.6 percent by e-commerce. Increasing 62 percent of over 2019. This company as an example must keep working towards accelerating and scaling services to match up the customer demands and the evolving trends with competitors. Each company is aiming at being at the top of the list in terms of customer satisfaction and matching up with existing trends. As per the latest research the global skin market size is valued at USD 109.71billion in 2023 and is predicted to grow from USD 115.65 billion in 2024 to USD 194.05billion by 2032, Exhibiting a CAGR of 6.68% during the forecast period putting Asia pacific at dominating 51.69% in 2023.

©IJRASET: All Rights are Reserved

These predictions are meant to be met with the latest investment in AI IoT- based technology and devices that offer personalized skin nourishment solutions which is expected to further boost the product demands ensuring the customers get personalized care solutions along with trendy packaging and a loyalty reward system which has attracted the attention of many users.

II. METHODOLOGY

A. AI Powered Skin Analysis

1) *How is AI used in skin diagnosis* – AI has made advanced skin diagnostics accessible to consumers through smartphones and online platforms which work on Algorithms. AI algorithms analyze facial images, skin type, concerns related to the skin such as dark circles, acne, pigmentation, skin tone, wrinkles, hydration level etc. These models work on Machine learning and are trained on extensive datasets of skin images, allowing them to accurately assess skin health and suggest appropriate treatment and products best suited for your individual skin types.
2) *Skin Analysis tools:* AI powered applications and devices are used by giant companies like L'oreal and Olay. Some of the names are L'Oreal Effaclar Spotcan, Olay's Skin Advisor. These applications allow users scan their faces and receive real-time insight on skin conditions. These applications provide the user with a skin score suggesting the percentage of different skin combinations they have including the hydration level. These diagnoses help users to get a balanced customized product best suited for their skin type.
3) *Impact of consumer behavior:* These high-tech AI tools and applications are helping users make informed decisions on their skincare, reducing the need for them to turn to instore consultation empowering users to self-manage their skincare regimes.

B. Personalized Skin Care

AI's ability to provide personalized skincare recommendation has brough about a huge change in the market and cosmetic industry. These Cosmetic industries have created a boom in the market for tailor made products and have combined skin type, lifestyle and environmental factor to best suite the needs of all end users.

1) *Data Driven Recommendation:* AI systems use data provided by the customer such as facial images, age, nationality as we as expectation to understand the customer's needs fully and give them a tailored skin care solution. AI ensures that it uses the data effectively and creates the best solution for everyone based on their own skin type.
2) *Real World Examples:* Brands are increasingly integrating AI into their online websites and stores for better customer experiences. L'Oreal Modiface, O'lay's Skin Advisor, Neutrogena's MaskiD are example of latest applications being used by giant companies who have takenup the skincare market.

C. Consumer Experience and Benefits

AI driven skin care applications have enhanced customer experience by offering convenience and personalized care. End users have been receiving professional- grade skin care advice all in the comfort of their homes, workspaces, during travel etc. making high quality skincare more accessible. Virtual skincare consultation powered by AI, combined with tailored products recommended has led to high customer satisfaction.

1) *Increased Efficiency and Accuracy:* AI helps users eliminate guess work by offering precise solutions and products that are of specific importance to the end user based on his or her skin type.
2) *Consumer Empowerment:* The outcomes of these AI driven analysis help users feel empowered as they finally are receiving skin care solutions that are specific to their needs.

III. AI IN MAKEUP

1) *Virtual Makeup Try Ons:* The Skincare industry carters to all its users 'needs such as makeup, accessories, eyelash extension, eye lenses, lip and cheek tints, pore minimizers, serums, foundations, nail colors etc. Users can try out different colors of the products via the app and make a pick from huge ranges of options. They can try on makeup virtually and see the result just at the click of a button. Virtual Try-ons are made possible by using facial recognition technology, which identifies the face all applying the makeup to the image giving the customer an idea of what the product or shade looks like on their skin type. Brands such as L'Oreal and Sephora have been using virtual try-ons for the last 4 years which has subsequently changed the face of their products increasing their customer base as their applications allow users to opportunity to try on the products before buying them

2) *Predictive Analysis:* AI can make analysis based on the consumers data provided to them about the future beauty trends, produced and services that are high in demand and which demand for more innovation and change. It helps the industry to forecast inventory needs and optimize production needs accordingly. It ensures that the company is well prepared of the products are in stock and those that need to be bought in so that customers receive them within the promised time.

IV. IMPACT OF CONSUMER EXPERIENCE

One of the main objectives of the Skincare industry is to ensure Customer experience is at its peak. AI is used by customers through chatbots and virtual assistance to help customers find products fitting for their skin.

V. FUTURE TRENDS AND INNOVATION

AI in skincare is rapidly evolving globally. Both cosmetic and clinical skin care are likely to further accelerate in the years to come with the advancement of personalization capabilities

1) *Sustainability in skin care:* AI is constantly trying to make its products and procedures more eco friends where the environment and animal cruelty are avoided. Future trends are now including AI driven product formulation where ingredients are made from minimal harm to the environment.
2) *AI – Enhancement Products:* Future trends include production of products that are specific to each customer's needs and AI ensure that the solution or recommendation offered is as accurate as possible.
3) *Expanded Data Sets:* Expanding datasets to include a waste variety of skin types and conditions to provide a must more accurate AI solution and reduce algorithmic bias.



Fig 1.2023 ,Fig 2.2031

VI. CHALLENGES AND LIMITATIONS

It is a given that the AI influence on Skincare technology has been a key instrument in creating a promising boom around the globe however, AI skincare faces certain challenges.

1) *Data Privacy Concerns:* AI technology requires customer data to function effectively. These involve facial images, age, geographic location, skin conditions, and other personal data this raises concerns within the users who highly demand for their sensitive data must be kept secure.
2) *Algorithm Bias:* Some training data in AI sometimes is biased if the data given lacks diversity. This leads to incorrect or inaccurate skin diagnosis for people with dark tone skin or skin color other that the standard skin type.
3) *Complexity in skin type:* AI uses images and other data provided by users to offer suggestions however, it can be extremely challenging sometimes as our Human skin is extremely complex and changes based on external factors like weather conditions, health of the user, diet, hormones can influence its condition either temporarily or permanently making it extremely challenging for AI to a 100% accurate solution.
4) *Cost:* The implementation of AI is expensive and hence can be difficult to afford by small scale companies.

VII. KEY TAKEAWAYS

1) Artificial Intelligence powered skin care analysis and personalization of skin care products and solutions are transforming the beauty industry at a rapid pace.
2) AI provides easy access to high grade professional- grade skin diagnosis and tailored skincare routines.
3) Future innovations in AI will defiantly have a positive impact on innovative personalized solutions that will be accurate and sustainable.

VIII. CONCLUSIONS

AI is reshaping the skincare industry with its wide range of services. It offers personalized solutions, better skin diagnosis at the click of a button and enhanced customer experience. As technology continues to evolve, AI's role in skin care is expected to grow drastically soon. This means that the apps and products used by end users is going to be under constant changes to meet the above expected mark for customers. This means the skin care industry is going to undergo constant changes and improvements in level of accuracy that it with provide with more accurate, accessible and sustainable skincare solutions and products. Raise in demand mean a huge responsibility on the Skincare industry to ensure that the data provided by the users is always kept confidential. Also, the increase in need to ensure algorithm bias is in constant check to ensure equitable use of AI in skincare for all customers especially for those with nonstandard skin color and conditions.

IX. ACKNOWLEDGMENT

I would like to express my gratitude to all the researchers and authors whose groundbreaking work has laid the foundation for this survey paper on the influence of Revolutionizing Skincare through Artificial Intelligence**.** The insightful findings in these research papers have been extremely informative and invaluable in guiding exploring and finding information during this study.

I am indebted to the seminal papers on AI- Powered Dermatology and Virtual AI in Makeup application, Personalized skin care solutions whose rigorous work on image recognition technology, data – driven product recommendation and virtual beauty applications have significantly informed this survey. Their contribution has been instrumental in the skincare industry.

I would also like to thank the pioneers in AI ethics and dermatology, whose research has highlighted the challenges and limitations that need to be addressed for AI to reach its full potential in the skincare market.

Last but not the least, I would like to thank my professors and faculty members who have provided us with resources and guidance to complete this study. Their insights and constructive feedback have been instrumental in providing me with the support needed to meet the expected outcome.

REFERENCES

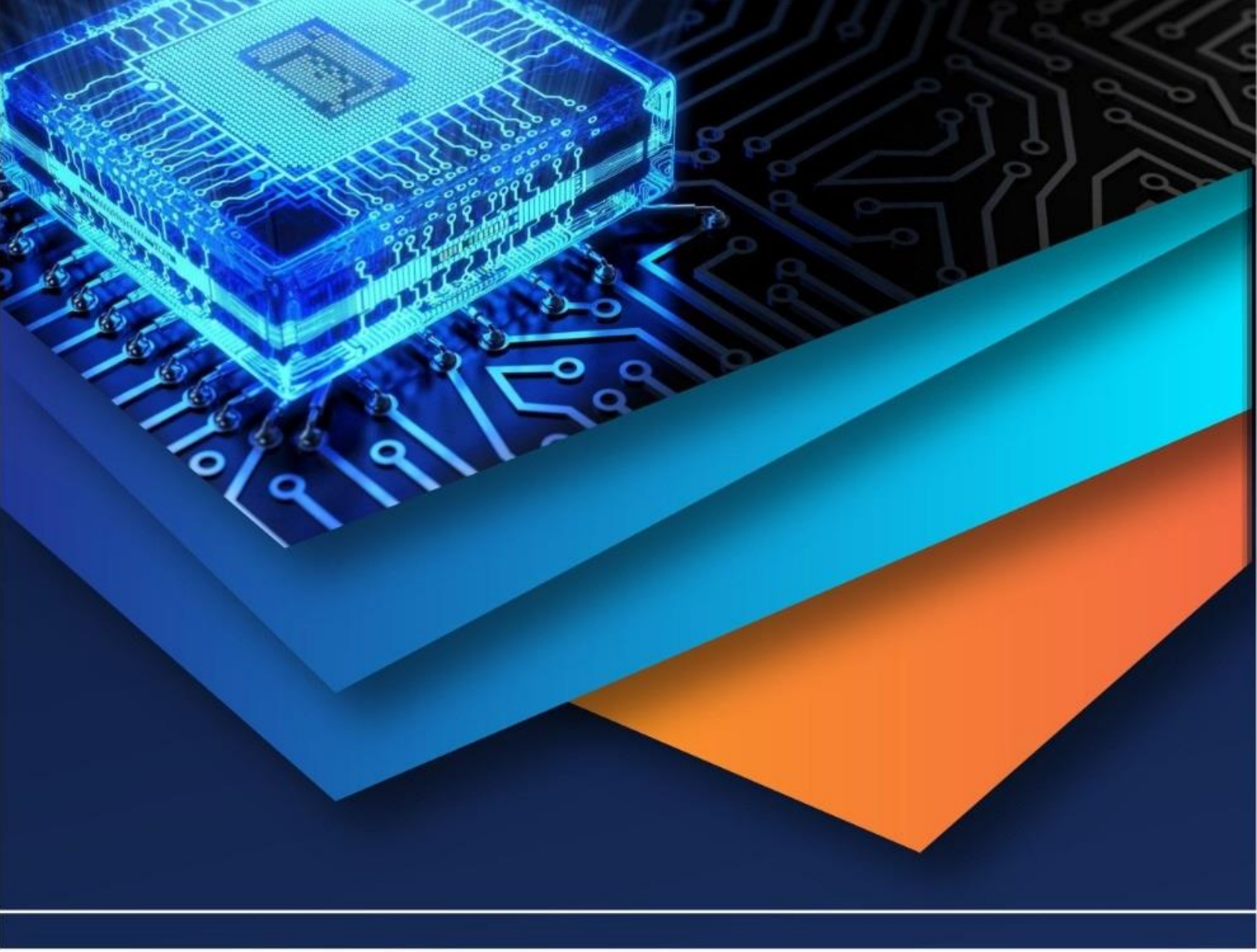
[1] https://www.henrystewartpublications.com/sites/default/files/DSM9.1HowL%E2%80%99Or%C3%A9aladoptednewtechnologiestoscalepersonalisation.pdf
Author - JaKenna Gilbert Nordic Group Digital Director, L'Oréal, Denmark

[2] https://www.academia.edu/84665745/AI_enabled_makeup_tool?auto=download
Author - Dr. Shailendra A Aote, Archana Potnurwar, Sreya Vallabhaneni, Naveen Reddy Pogalla, Pure Kumar, Rohit Bhavesh Dosh, Syed Armaan Khurram

[3] https://www.researchgate.net/publication/380066660_Lash_Tech_A_Web_App-Based_Lash_Recommendation_Virtual_Try-
Authors - Allen Jasfer G., Pilapil, Catherine Ann D , Flores, Matthew L, Centeno Criselle J, Casiw, Gaypeln M, Nulud, Mary Grace D.

[4] .https://www.researchgate.net/publication/337786817_A_Virtual_Makeup_Augmented_Reality_System
Author- Aline De Fatima Soras Borges, Carlos H. Morimoto
[5] .https://www.academia.edu/103790619/Virtual_Makeup_Application_Using_Image_Processing_Methods
Author – Gozde Yolcu Oztel , Serap Kazan
[6] RUN: Sustaining a top position in the beauty market - adapting L'Oréal's winning formula (unl.pt)
Author- Branco, Ines Casquinha David
[7] . https://www.ncbi.nlm.nih.gov/pmc/articles/PMC9693628/
Author – Zhouxiao Li, Konstantin C Koban, Thilo L Schenck, Riccardo E Giunta, Qingfeng Li and Yangbai Sun
[8] Frontiers | Development and validation of an artificial intelligence-powered acne grading system incorporating lesion identification (frontiersin.org)
Author - Jiaqi Li, Dan Du, Jianwei Zhang, Wenjie Liu, Junyou Wang, Xin Wei, Li Xue, Xiaoxue Li, Ping Diao, Lei Zhang, Xian Jiang
[9] https://ijrpr.com/uploads/V4ISSUE4/IJRPR11783.pdf
Author - Sunil Hegde, Sara Elias, Stuti Arora, Sidharth Adlakha, Nihira Garg, Tanisha Kant
[10] How artificial intelligence adopts human biases: the case of cosmetic skincare industry | AI and Ethics (springer.com)
Author- Anastasia Georgievskaya, Timur Tlyacher, Daniall Danko, Konstantin Chekanov, Hugo Corstjens
[11] https://www.ncbi.nlm.nih.gov/pmc/articles/PMC9386451/
Author – YingChen, Catherine Prentice, Scott Waven , Aron Hisao
ADDITIONAL REFERENCE LINKS https://www.fortunebusinessinsights.com/skin-care-market-102544
[12] https://timestech.in/the-role-of-artificial-intelligence-in-the-skincare-industry/
[13] On_and_Seamless_Booking_App_Using_Geo_Location_Powered_by_Artificial_IntelligenceTorres,
[14] https://learncanyon.com/future-of-ai-skincare/#:~:text=AI%20is%20also%20used%20in,development%20of%20innovative%20skincare%20solutions
[15] https://www.researchgate.net/publication/368343165_Artificial_Intelligence_based_Smart_Cosmetics_Suggestion_System_based_on_Skin_Condition
[16] Links : file:///C:/Users/lilli/Downloads/Artificial_Intelligence_in_Cosmetic_Dermatology_A_%20(2).pdf

©IJRASET: All Rights are Reserved | SJ Impact Factor 7.538 | ISRA Journal Impact Factor 7.894 |



10.22214/IJRASET

45.98

IMPACT FACTOR: 7.129

IMPACT FACTOR: 7.429

INTERNATIONAL JOURNAL FOR RESEARCH

IN APPLIED SCIENCE & ENGINEERING TECHNOLOGY

Call : 08813907089 (24*7 Support on Whatsapp)