

The rise of artificial intelligence in medicine: Applications in dermatology

Ekta Yadav*, Stephanie Friedman, Jasmine Boskent, Katherine Vanta

Skincare Anarchy LLC, New Jersey, United States

Everyone has different factors that influence their skin—age, humidity, and pollution are just a few. Therefore, skincare products that work for one person won't necessarily work for another. In recent years, the beauty industry has begun using artificial intelligence (AI) to analyze databases of skincare ingredients and provide consumers with products tailored to fit their individual needs. We review the pros and cons of using AI in dermatology from a consumer, physician, and business perspective. We also focus on the company PROVEN Skincare, who created a comprehensive skincare database that won MIT's 2018 Artificial Intelligence Award [1], and recently secured a groundbreaking patent that protects the use of personalization in skincare [2]. AI is making huge strides in dermatology that ultimately save time, money, and waste associated with choosing skincare products via the trial-and-error approach. It is important to support companies using AI as this technology continues to advance and improve the way consumers select their skincare products.

Would you go to the drugstore pharmacy and ask for the most popular medicine, or the one with the prettiest packaging? Of course not, because that wouldn't give you what your body truly needs. Modern medicine has been personalized since the 1950's, when human genome mapping was discovered to provide a better understanding of peoples' genetic makeup [3]. When it comes to protecting the largest organ we have (the skin), however, consumers are still choosing their products for reasons that don't necessarily indicate the products will work. It's not their fault—people are still in the dark as to what products will truly help them, and so they rely on trial and error to search for results. Without a medical degree, it's difficult for the average person to find what they need.

Ming Zhao and Dr. Amy Yuan, co-founders of Proven Skincare, are hoping to change that. They created the Skin Genome Project™, the winner of MIT's 2018 Artificial Intelligence (AI) Award, which is a comprehensive skincare database that uses AI to analyze the effectiveness of over 20,238 skincare ingredients [1]. It takes 47 different factors into account (including pollution, humidity, and water hardness) to give consumers skincare products tailored to fit their individual needs. Proven Skincare was born out of the co-founders' personal frustrations with the products available on their skincare journeys, and recently, Zhao and Yuan secured a trailblazing U.S. patent that protects the use of personalization in skincare.

"When we first came on the space, a lot of these major beauty companies were quite incredulous at what we were planning to do," Zhao told Skincare Anarchy [2]. "We had to continue steadfast in our belief that data, AI, and technology have improved our lives in such profound ways. Why doesn't it get to improve our skin? What is it about our skin that doesn't deserve science?"

According to a recent market intelligence report by InsightAce Analytic, "the global AI in beauty and cosmetics market size was valued at \$2.7 billion in 2021 and is expected to reach \$13.34 billion in 2030" [4]. Although AI is still relatively new to skincare, it continues to change our world dramatically. It is incredible for medical technology to be so advanced, but one cannot help but wonder about the long-term effects these machines will have on the future of healthcare. So what are the pros and cons of AI, and what can we expect in the years to come?

According to the article "Pros & Cons of Artificial Intelligence in Medicine" by Drexel University College of Medicine, "AI has doubtless potential to improve healthcare systems. Automating tedious tasks can free up clinician schedules to allow for more patient interfacing. Improving data accessibility aids healthcare professionals in taking the right steps to prevent illness. Real-time data can better and more rapidly inform diagnoses. AI is being implemented to reduce administrative errors and save vital resources" [5]. AI provides physicians with data much faster, and they can use that information to focus on improving patient care. It even allows them to keep up research on illnesses and other factors in real-time, so everything is up to date. The COVID-19 pandemic is a prime example of how these machines are essential to track data but aid in workable solutions. Physicians already have a chaotic role to fill being health providers, and the world continues to bring about new health issues. They cannot do their jobs alone and need technical support to supply resources and information to the public faster.

Another pro of AI is that consumers can save money by buying products they know will work for their skin. How often have you purchased an expensive skincare product, just to discover that it made you break out or didn't do anything? A poll revealed that nearly 80% of the people surveyed somewhat or strongly agreed with using trial and error to determine what products work best for their skin, and 53% have changed their skincare products over time [6]. Many consumers don't know where to start when choosing their skin care products, and this trial-and-error approach is expensive, time consuming, and wasteful. Ultimately, it makes skincare less accessible for those who can't afford to try new products constantly.

A benefit for consumers and companies alike is that customer retention rate is higher if products really work. Skincare brand Maelove

*Correspondence to: Ekta Yadav, Skincare Anarchy LLC, New Jersey, United States, E-mail: Exy57@case.edu

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used AI to create their best-selling Glow Maker serum—they analyzed over three million online product reviews to understand the needs of customers and create a product that works. To date, the Glow Maker has had four sellouts and is currently taking pre-orders for a fifth round [7]. For companies, AI strategies like this are beneficial as repeat customers increase brand loyalty (leading to word-of-mouth marketing) and profits. For consumers, returning to a product that works saves time, money, and stress (and improves their skin!). As Zhao said to Skincare Anarchy, “We don’t need more products or advice—we need the right products” [2].

It is no secret that AI can be a valuable ally in technological advancements, but everything has its limits and issues. The Drexel University College of Medicine article also points out some of the cons of AI and its effects on healthcare operations. “AI is increasingly applied to healthcare, and limits and challenges continue to be confronted and overcome. AI still needs some human surveillance, may exclude social variables, experiences gaps in population information, and is susceptible to increasingly calculated cyberattacks” [5]. AI is still a machine and needs a human operator to produce, which can be an issue for future jobs. Many physicians employ researchers for their work, but a person may become obsolete with AI. Even machines take part in several surgical procedures, aiding medical staff. We may not be too far off from a time when many medical encounters we have will be in the presence of a machine. But that in turn affects the importance of human interaction because AI cannot sympathize with patients. What

happens if medical operations rely so much on AI that they eventually taper information from lack of supervision? Every day our technology is vulnerable to cyberattacks, and AI is not immune to this threat. It is why constant care is needed, but there is only so much a person can track. Although technology supplies tremendous advancement in medical study and care, it should not change healthcare ethics.

While it’s important keep these warnings and potential downsides in mind, AI in skincare is clearly continuing an upward trajectory. And for good reason—it leads to products that actually improve peoples’ skin. While cute packaging is aesthetically pleasing, think about what is important to you when choosing your skincare products—first impressions or lasting impressions?.

References

1. About Us. (2022) Proven Skincare.
2. Yadav Ekta (2022) host. “Customization of Skincare Is Here ft. Ming Zhao of PROVEN Skincare.” *Skincare Anarchy*, episode 328.
3. “Milestones in Personalized Medicine: From the Ancient Time to Nowadays – the Provocation of COVID-19.” National Library of Medicine.
4. “Global Artificial Intelligence (A.I.) in Beauty and Cosmetics Market worth US \$13.34 Billion by 2030 – Exclusive Report by InsightAce Analytic.” Cision PR Newswire.
5. “Pros & Cons of Artificial Intelligence in Medicine.” Drexel University College of Computing and Informatics.
6. “Americans say lockdown has given them time to focus on skin care.” SWNS Digital.
7. “How Beauty Brands Are Leveraging AI for Customer Acquisition.” Infinite Analytics.