

ECOCHIC: AN AI-DRIVEN DIGITAL CLOSET APP FOR PROMOTING SUSTAINABLE FASHION AND CLOTHING DONATION

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ABSTRACT

The rapid growth of fast fashion has caused serious environmental harm and encouraged unsustainable consumption habits. At the same time, many people accumulate excess clothing, while vulnerable populations struggle to meet basic apparel needs. To address this gap, this project introduces EcoChic, a mobile application that promotes sustainable fashion practices and facilitates clothing donations. Its main features include a digital closet, StyleMate AI, and an interactive donations page. The digital closet enables users to organize clothing while receiving personalized sustainability scores and care recommendations via a ChatGPT API call. StyleMate AI offers eco-friendly outfit suggestions and shopping guidance, with an experiment showing that 50% of responses perfectly matched expected outputs and the remainder were rated strong to moderate. The donations page uses a map interface to locate nearby donation centers, making it easier for users to redirect unwanted clothing. By combining personalized sustainability insights with practical donation tools, EcoChic encourages mindful consumption, reduces textile waste, and supports both sustainable consumer behavior and community needs.

KEYWORDS

Sustainable fashion, Digital closet, AI-powered app, Clothing donation

1. INTRODUCTION

The environmental impact and other consequences of fast fashion have been detrimental to the United States. However, many people with financial instability cannot afford higher-quality clothing and are left relying on cheap, low-quality garments [1]. According to Business Insider, fashion production accounts for 10% of total global carbon emissions, which is equivalent to the emissions produced by the entire European Union [2]. The industry also depletes water sources and pollutes rivers and streams, while 85% of all textiles are discarded in landfills each year [3]. Meanwhile, over 500,000 people experience homelessness on any given night in the United States, with roughly 13,000 of these individuals dying every year [4]. Clothing is a basic necessity that provides protection and hygiene, yet fast fashion's poor quality results in garments that wear out quickly and are frequently discarded. In the United States, the average person purchases 60% more clothing than in 2000 but keeps items for only half as long [5]. This overconsumption not only wastes money that could be donated but also contributes to environmental pollution [6]. As global human populations grow, the unsustainable production of low-quality materials, such as polyester, accelerates waste accumulation. If trends continue, global municipal solid waste is projected to reach 3.4 billion metric tons by 2050 [7]. Although not all of this waste comes from fast fashion, the industry represents a significant portion,

highlighting the urgent need for sustainable practices to ensure the planet remains habitable for future generations.

The first methodology involved an EU strategy aimed at promoting the repair and recycling of garments, with the goal of reducing fast fashion consumption and encouraging higher-quality clothing. The second approach focused on a singular winter clothing donation for the homeless in the town of Catanduva, where residents were asked to contribute clothes, blankets, and money. The third method consisted of a series of one-day workshops held in the UK, each highlighting a different stage of the clothing production process. These workshops sought to raise awareness of the labor and waste involved in garment production and encourage participants to choose higher-quality clothing. While each of these methods has merit, they share notable limitations: their short duration restricts their reach, and awareness alone does not always translate into personal action. In contrast, my app enables users to assess the eco-friendliness of their own clothing and understand the environmental impact of their choices through a digital closet. It also gives access to donation centers worldwide, providing both personalized engagement and global scalability.

EcoChic is an eco-friendly clothing-focused application designed to promote sustainable fashion practices while engaging users in a personalized and interactive way. It was created on a platform called Flutterflow, an application development platform with a drag and drop interface [8]. EcoChic's central feature allows users to simulate their actual closet online, assessing the sustainability of their clothing and determining whether it is time to donate items. By seeing a wardrobe, users gain a clearer perception of what they need and what can be given away, overcoming the perception that donation or sustainable action is time-consuming or inconvenient. EcoChic is unique in combining a digital closet with an AI-driven stylist, making the app both engaging and educational. It not only emphasizes environmental responsibility but also encourages thoughtful fashion choices, showing users how to style themselves in ways that benefit the planet. Users can quickly add items by taking a photo and providing basic details like the clothing brand and material, enabling the app to store comprehensive sustainability information without requiring too much information. This compact and user-friendly design simplifies wardrobe management, enhances awareness of environmental impact, and motivates meaningful action. By integrating fun, convenience, and social responsibility, EcoChic empowers users to improve their fashion habits while contributing positively to both the environment and communities in need.

I conducted an experiment on my AI tool, StyleMate, to evaluate how closely its responses matched with the expected. Since the questions are open ended and based on recommendations, there is no exact answer, so the grading scale was a little different. I first created 20 random inputs with possible questions that people might realistically ask and then generated basic outputs with a separate AI tool. Then, I asked StyleMate to answer all 20 of those questions and put the answers in the actual output column. Although StyleMate's answers were generally longer than the expected outputs, they were quite similar in content. I asked the actual ChatGPT to evaluate how closely each response matched the expected output on a scale from 1 to 10. Fortunately, the ratings were mostly in the 8-10 range, indicating that the tool gives generally accurate responses. Overall, the experiment was successful, demonstrating that StyleMate delivers reliable and useful advice for users.

2. CHALLENGES

In order to build the project, a few challenges have been identified as follows.

2.1. Authentication

What happens if I forget my password?

There is a button on the sign in page that people can click on if they forgot their password and it will send an email to their account in order to create a new one.

Do I need to go through authentication to use the app?

Authentication is necessary to use the app because people need accounts in order to have closets and personal recommendations.

Is my password protected?

The passwords are encrypted once submitted so only the person who created the password should know it, and if they forget they can just set a new one.

What is the authentication method?

The authentication method is pass-word based and requires users to sign in with a username and password.

2.2. Recommendation/AI

How does the recommendation system work?

The user can ask any question they want regarding fashion/clothing (Ex: What should I wear today? What clothes are good for hot weather? Where are some trendy affordable stores I can shop for online?) and it will provide a detailed answer.

What data is used to make recommendations?

The chat usually uses the data provided by the user in the prompt and otherwise provides general but thorough answers if not given specific details.

Does the chat remember old messages?

The StyleMate does not remember old messages; however, that is not that important for the function of this AI because the questions normally do not need follow ups. If anything, the user can extend the original prompt.

How accurate are the recommendations?

The recommendations are usually accurate unless there is a specific detail that the AI was not made aware of(ex: Asking what clothes to wear but not specifying that it is raining outside).

2.3. Donations

How will it know my location?

The app will ask the user to allow/not allow their location to be shared and then relocate the maps towards the location if given permission.

How can I find out where nearby donation centers are?

The map will have a number of red markers scattered around, each representing a donation center that are near the user.

Where will I find the information for each of the donation centers?

Once you click on a red marker, a pop up will arrive with information regarding the location name and address.

Is this app using the official google maps API?

EcoChic uses the API provided by google maps to provide accurate and up to date donation locations.

3. SOLUTION

Upon opening the application, the user is directed to the authentication page. Existing users can sign in using saved accounts retrieved from our Firebase database, while new users can switch to the sign-up screen to create an account, which is then added to Firebase Authentication [9]. After signing in, the user is taken to the homepage where they can access their profile in the top-right corner to update personal information, which is saved to the Firebase user collection. The homepage features three main options. The first is the digital closet, which initially starts empty and allows users to add clothing items to it via an add clothing page, where they can customize descriptions and save entries to Firebase before adding them to the closet. The second option is donation goals, which utilizes a Google Maps API call to locate the user if given permission and mark nearby donation facilities. Users can select a marker to view more information. The final option is an AI tool called StyleMate, powered by a ChatGPT API [10], which answers user questions about clothing, such as what to wear or where to buy quality clothes.

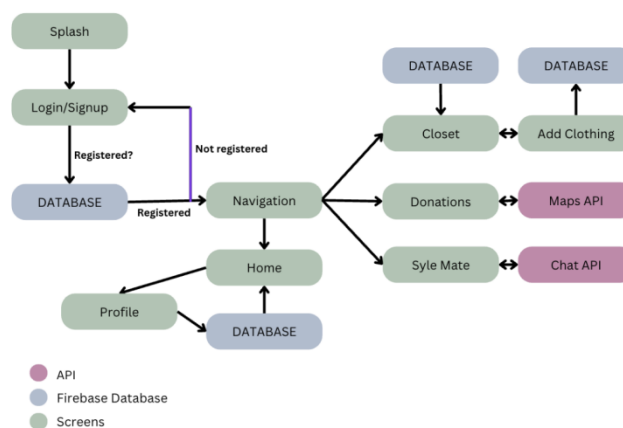


Figure 1. Overview of the solution

The first component in the program is the authentication system. It allows users to sign into their account or create a new one because an account is necessary to use the app. The main service used for authentication is the firebase authentication, because it securely stores both new and existing user information to simplify the sign in process.

Figure 2. Screenshot of sign up and sign in page

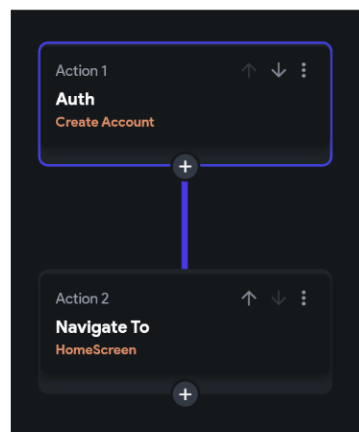


Figure 3. Screenshot of code 1

The account creation process is initiated through the sign-up tab. When the user selects the “create account” button, a new document is generated within the Firebase Database under the Users collection [11]. The username and password is sent to the Firebase Authentication, where a user ID is created. The password is encrypted to ensure security, preventing unauthorized access. This user ID is randomly generated and guaranteed to be unique across all accounts. Then, default values for the profile picture and display name are assigned in the database, which the user may later modify. After successful account creation, the user is automatically directed to the home screen. While not illustrated here, the sign-in process operates similarly: it validates the entered email and password against existing user documents, retrieves the corresponding data upon successful authentication, and navigates the user to the home screen.

The second component is the digital closet, which allows users to store their clothes by uploading images and providing brief descriptions. It includes an entry for each piece of clothing, organized by attributes like name, type, and color. Additionally, each entry includes a leaf icon that directs the user to an eco-rating page. This page provides information regarding the environmental impact of the clothing item and offers care recommendations tailored to its specific material and type.

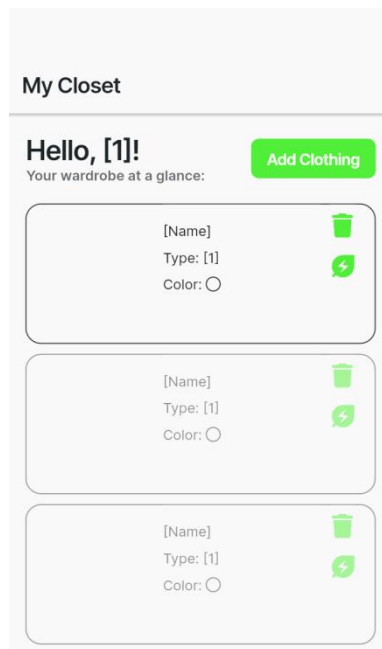


Figure 4. Screenshot of digital closet page

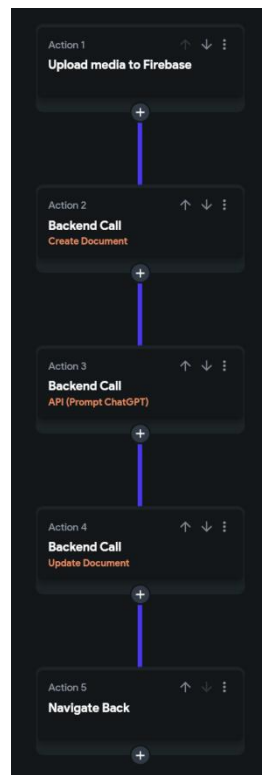


Figure 5. Screenshot of code 2

To add clothing, the user must go to a separate page called “add clothing” to enter information. If the closet is empty, adding a piece of clothing will create a section called clothing in the Firebase Database and store its information there. The information includes type, color, name, and image. Then, for each piece of clothing, a prompt is called for ChatGPT: “Based on the image given and

the data provided give me in JSON format the following data. EX: { ecoFriendliness: 70%, 80% (percentage from 1 to 100), decimalRating: same thing as eco-friendliness, just as a decimal (.7, .8, etc.), materialSustainability: Bad/Moderate/Good/Excellent, productionImpact: Bad, Moderate/Good/Excellent, durability: Bad/Moderate/Good/Excellent, tips: [list of tips in order to take care of this piece of clothing.” An important factor to note is that images must be converted to Base64 before being sent to the API. To facilitate this, a custom function, imageToBase64, was implemented. Users can view the analysis by clicking the leaf icon associated with each clothing item, which directs them to the eco-rating page. This page will display the overall eco-friendliness of the clothing item out of 100%, and then rate it out of 3 categories: Material Sustainability, Production Impact, and Durability. Additionally, ChatGPT supplies care recommendations aimed at promoting sustainable and environmentally conscious use. While the detailed analysis is displayed only on the eco-rating page, the basic information for the clothing like type, name, description, image, etc. will be displayed in the main digital closet.

The third component is StyleMate AI, which is an artificial intelligence tool that acts like the user’s personal fashion assistant. It can provide anything from outfit advice to clothing recommendations for the next shopping spree. The app uses OpenAI API gpt4.1 model to have a seamless experience interacting with the assistant [12].

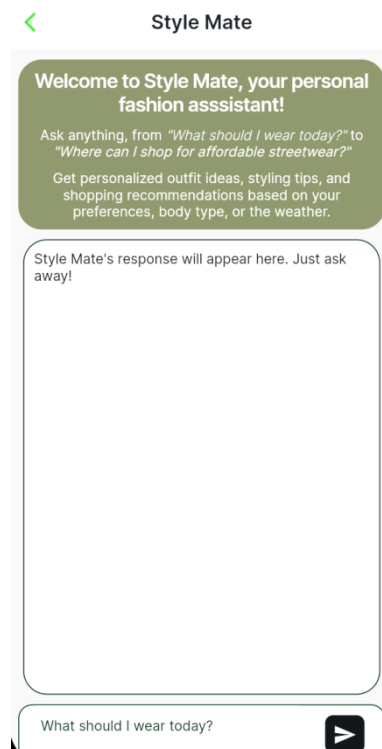


Figure 6. Screenshot of chat bot

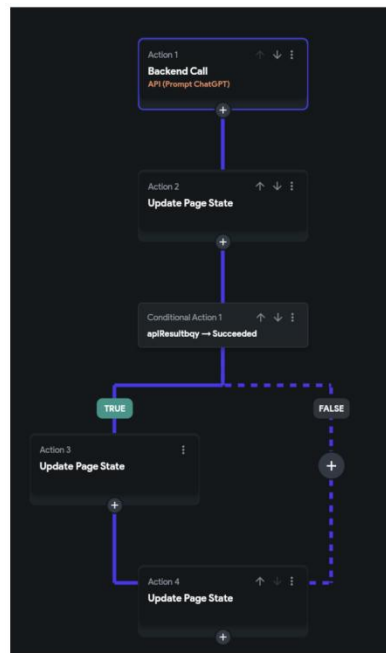


Figure 7. Screenshot of code 3

The third component of the application is an AI tool called StyleMate, which leverages the ChatGPT API to provide personalized recommendations to users. It gives the API a prompt: “You are a helpful assistant for an eco-friendly clothing app. Users will come to you with questions about what they should wear for the day, where to shop for clothes, etc. You should give responses that encourage eco-friendliness, such as buying or wearing clothes made from sustainable materials and donating unused clothes. Only give answers in plaintext paragraphs, no bullet points and no Markdown formatting.” If the user enters a prompt and it passes the condition checks, it is sent to the API. If the submission fails, the system automatically retries until a successful response is generated. The ChatGPT API then returns a short paragraph recommendation, which is displayed in the middle box after a couple of seconds.

4. EXPERIMENT

To evaluate the accuracy of the StyleMate AI, an experiment was conducted to compare the actual outputs with the expected outputs. StyleMate leverages the ChatGPT API and functions as a personalized fashion assistant, providing users with outfit suggestions, styling guidance, and shopping recommendations tailored to individual preferences, body type, and environmental factors such as weather. Given the open-ended nature of user questions, which often lack a single correct response, the validity of the tool was assessed by comparing its outputs with those generated by a separate AI system. The resulting responses were then analyzed using ChatGPT, which rated their accuracy and evaluated the relative quality of StyleMate’s recommendations on a scale from 1 to 10. This experiment enabled a systematic assessment of both the reliability and the utility of the AI in providing personalized fashion guidance.

	Input	Expected Output	Actual Output
1	What should I wear today if it's going to rain and I have to walk a lot?	Rewearing rain gear and comfortable shoes you already own is highly sustainable.	With the forecast predicting rain and since you'll be walking a lot, it's important to prioritize both comfort and eco-friendliness. Start off with a base layer of organic cotton or bamboo fabric shirts as these are breathable, soft, and sustainable. Pair this with a comfortable pair of pants made from eco-friendly material such as organic denim or hemp. (rating: 7/10)
2	I need a dress for a wedding this weekend. Any sustainable brands you recommend?	Buying from ethical brands is great, but renting or borrowing would be even more eco-friendly.	Absolutely! If you're looking for an elegant dress with sustainability in mind, Reformation could be a great choice. Their mindful manufacturing process uses less water and energy compared to conventional methods, and they also invest in green building infrastructure to minimize their waste, water, and energy footprints. Another brand to look at is People

			Tree. They are known for their use of organic cotton and fair trade practices, providing a collection of elegant and stylish dresses suitable for weddings. Pact is another sustainable brand that uses organic cotton and practices fair trade, ensuring the workers are paid equitable wages. Lastly, Thought Clothing is renowned for its use of naturally grown bamboo, cotton, wool and hemp that are free of harmful pesticides and chemicals. They all offer stunning outfit options that not only make you look good but also make you feel good about your environmentally friendly choices. (rating: 8/10)
3	Should I throw out old clothes that don't fit anymore?	Throwing clothes away adds to landfill waste. Better to donate or recycle.	Absolutely not! Discarding old clothes contributes to the growing problem of textile waste. Instead of tossing them out, there are many eco-friendly actions you could take. You could donate them to thrift stores or charities that accept used clothing. You could also host a clothes swap meet with friends. This can be fun and you might find something new to you that fits! If the clothes are too worn to be used again, consider recycling them. Many cities have textile recycling facilities. Lastly, if you're feeling creative, you could repurpose them into something else, like rags for cleaning or even a fashionable new item. Remember, every small

			step towards reducing waste helps protect our environment. (rating: 10/10)
4	Is it eco-friendly to buy clothes made from bamboo?	Bamboo has potential, but only if processed sustainably. It depends on the manufacturing method.	Absolutely, buying clothes made from bamboo can be far more eco-friendly than purchasing those made from traditional fabrics like cotton or polyester. Bamboo is praised for its sustainable qualities: it requires less water to grow, doesn't need harmful pesticides, and is remarkably renewable because it grows rapidly. Furthermore, clothing made from bamboo is generally breathable, hypoallergenic, and absorbent, making it comfortable to wear. However, it is important to keep in mind that the process of converting bamboo into fabric can have its own environmental impacts, so investigating brands and their manufacturing practices is recommended to be certain they align with eco-friendly values. (rating: 9/10)
5	What are good materials to look for in sustainable clothing?	Choosing organic or recycled materials is one of the best ways to lower your clothing footprint.	Sustainable clothing often comes from materials that are both eco-friendly and ethically sourced. When you're shopping, look for clothing items made from natural materials like organic cotton, linen, and hemp. Organic cotton, for instance, is grown without harmful chemicals, allowing for safer working conditions for cotton farmers, and significantly reducing environmental damage. Hemp and linen are two more great options because these plants require relatively little water or pesticides to

			grow. (rating: 10/10)
6	I'm going hiking tomorrow. What should I wear?	Wearing existing or secondhand gear is ideal for sustainability and durability.	For a hiking trip, comfortable and protective clothing is crucial keeping in mind the changing weather conditions. As an eco-conscious individual, you should consider wearing eco-friendly clothes. A cotton t-shirt made from organic cotton which is free from harmful chemicals will keep you at ease throughout. A pair of pants made from recycled polyester or organic cotton would be a smart bet as they are breathable and durable. (rating: 7/10)
7	Where can I find good second hand jeans?	Shopping secondhand reduces waste and gives clothes a second life. Great choice.	There are many wonderful options when it comes to finding quality second-hand jeans. Thrift stores, consignment shops, and vintage boutiques are all great places to start locally. Don't forget to look for flea markets or garage sales in your area as well, as they can often have hidden gems. (rating: 10/10)
8	Can I wear the same outfit two days in a row?	Repeating outfits is one of the easiest and most sustainable habits.	Absolutely, you can wear the same outfit two days in a row! As a matter of fact, being an advocate for eco-friendly fashion often involves changing the way we consider the life span of our outfits. We're socially conditioned to think that repeated wearing of the same outfit is a faux pas. But the reality is, it is a highly effective way of reducing your fashion footprint. You can bring new life and versatility to a single outfit by accessorizing

			differently or layering with additional pieces. It's all about getting creative and maximizing wearability, without compromising on style. Moreover, less frequent washing saves water and extends the life of your clothes. Embrace the idea of a capsule wardrobe that is minimalist yet fashionable and eco-friendly. (rating: 10/10)	10	Should I buy new clothes for back-to-school?	Buying new can be okay if done mindfully, but reusing or thrifting is better.	While you may need some new items for back-to-school, you should consider buying secondhand or using what you already have first. There are many thrift stores that sell quality pre-loved clothing that is just as good as new items and much more eco-friendly. Moreover, keep an eye out for brands that focus on sustainability and use organic or recycled materials if you do decide to buy new clothes. Some companies also offer take-back programs, where they recycle your old clothes when you buy their products. Also remember, donating or selling the clothes you don't wear any more is another eco-friendly option. Remember, every effort counts towards a healthier planet. (rating: 9/10)
9	How do I take care of my clothes so they last longer?	Proper care extends a garment's life and drastically reduces its environmental impact.	Taking care of your clothes to ensure they last longer primarily involves conscious cleaning methods and careful storage. First, always follow the care label instructions on your clothing. When possible, wash clothes in cold water, as it is gentler on fabric. Air dry your washed clothes instead of using a dryer to maintain their quality. Avoid ironing whenever possible to prevent unnecessary wear and tear. Tidy up minor tears and loose threads to prevent them from worsening. For storage, make sure your clothes are clean and completely dry to avoid pests and mold. Fold heavier clothes instead of hanging to prevent stretching. Finally, rotate your clothes regularly to even out the wear and tear. Remember, the longer your clothes last, the more environmentally-friendly your wardrobe becomes, as it reduces demand for new apparel and lessens textile waste. (rating: 10/10)	11	What's a good sustainable outfit for a date?	Rewearing what you have or choosing secondhand is stylish and eco-conscious.	For a sustainable but stylish date outfit, consider a chic midi dress made from organic cotton or sustainable viscose. Pair it with a beautiful recycled leather jacket for a bit of edge and some ethical vegan leather shoes. Complete the look with some lovely jewelry crafted from recycled metals and perhaps a clutch made from cork or other renewable materials. Remember, an outfit isn't just about looking good - it's also an opportunity to express your values and commitment to environmental

			stewardship. Shopping from brands focused on ethical and sustainable practices can also be a great conversation starter for your date. (rating: 6/10)
12	I need workout clothes. Any eco-friendly options?	Buying from sustainable activewear brands is good, but only if you truly need them.	Absolutely! For eco-friendly workout gear, consider brands like Patagonia which devotes 1% of its total sales to environmental groups. They use recycled materials and provide an excellent repair service to encourage long wear of their products. Outdoor Voices is another option; they use sustainable materials like recycled polyester. Girlfriend Collective offers leggings and bras made of recycled post-consumer bottles, and even their packaging is 100% recyclable. Lastly, PrAna offers a range of athletic wear made from organic cotton, recycled wool, and recycled polyester. By supporting these brands, you can work out feeling good not just about your health, but also about your impact on the environment. (rating: 7/10)
13	Is vegan leather better for the planet?	It can be, especially if made from natural sources, but synthetic versions may still pollute.	Vegan leather can certainly be a better option for the planet depending on the materials and methodology used in its production. One of the primary benefits is that it doesn't involve the slaughtering of animals and it's typically free from the harmful chemicals used in the treatment and dying process of traditional leather. However, it's important to

			be aware that not all vegan leathers are created equal. Some are made from PVC, a plastic that's harmful to the environment. Therefore, when shopping for vegan leather, it's best to opt for those made from plant-based materials such as cork, kelp, or pineapple fibers which are more sustainable and eco-friendly. (rating: 9/10)				worn-out shoes. Brands like Nike have a Reuse-a-Shoe program which takes your old shoes and transforms them into playgrounds and sports surfaces. Some organizations, like Soles4Souls and Shoes for Crews, also accept shoe donations and distribute them to people in need globally. Not only does recycling your shoes help in reducing landfill waste, but it also can provide resources for those in need. Rectifying the usage of your old shoes is a great way to stay sustainably fashionable. (rating: 10/10)
14	It's cold outside. What should I wear to stay warm sustainably?	Layering with existing or secondhand pieces made from natural or recycled fibers is smart and green.	To stay warm sustainably, opt for clothing made from eco-friendly materials. Begin with a base layer of ethical thermal wear, such as bamboo or organic cotton. On top, wear a sweater made from recycled wool or sustainable cashmere. Most eco-friendly brands use ethical wool, which ensures the sheep are treated well and that the land is farmed sustainably. For your outer layer, look for a jacket made from recycled or sustainably sourced materials, such as recycled polyester. A tip here is to opt for brands using PFC-free waterproofing. Your legs can be kept warm with pants made from organic cotton or recycled denim. Your shoes can be sustainably made too. Look for boots made from recycled materials and ethically sourced leather. (rating: 8/10)	16	Are capsule wardrobes sustainable?	Capsule wardrobes reduce consumption and focus on longevity, making them very eco-friendly.	Absolutely! Capsule wardrobes are incredibly sustainable. The basic concept of a capsule wardrobe is to create a closet of versatile items that you love to wear and can mix and match in several different ways. It encourages less wasteful fashion behavior and longer wardrobe life. This approach not only helps to reduce the vast amounts of textile waste, but also reduces the environmental impact of manufacturing, shipping, and disposing of large amounts of clothing. Plus, it can save you money and time in the long run. When creating your capsule wardrobe focus on eco-friendly brands that use sustainable materials and have ethical manufacturing. (rating: 10/10)
15	Can I recycle my shoes?	Recycling is better than trashing, but it depends on availability and shoe condition.	Absolutely, shoe recycling is not only possible but can also be a great eco-friendly choice. Various programs and recycling centers accept	19	How can I shop less but still dress well?	Shopping less and getting creative with what you own is excellent for both style and sustainability.	sustainable lifestyle. (rating: 10/10) One of the best ways to shop less but still dress well is by adopting a capsule wardrobe concept. A capsule wardrobe consists of a minimal number of pieces that can be interchangeably combined to create a variety of outfits. Try focusing on investing in few but high-quality, timeless pieces that won't go out of style. Opt for pieces in colors that go well with each other to increase the possible combinations. When shopping, consider adhering to sustainable fashion options, such as buying from eco-friendly brands, thrifting, or swapping clothes with friends. Remember to properly care for your garments to prolong their lifespan. Finally, regularly decluttering and donating unused or old clothes also prove helpful. (rating: 10/10)
17	Where can I donate clothes locally?	Donating helps reduce waste and supports community reuse. Just be sure items are wearable.	Donating your gently used clothes is a great way to give them a second life and be eco-friendly. You can typically find local charities or non-profit organizations that accept clothing donations. Goodwill and Salvation Army are two well-known organizations that allow you to drop off clothes at their stores or donation bins. Local shelters or community centers might also appreciate clothing donations. Check their websites or contact them directly to inquire about their donation policies. Also, consider donating to thrift stores and consignment shops. Most importantly, make sure the clothes you're donating are in good condition and have been cleaned. (rating: 10/10)	20	What's the most eco-friendly way to stay on trend?	Adapting trends using old or thrifted clothes is fun and avoids unnecessary purchases.	Staying trendy while also being eco-friendly isn't as daunting as it might seem. It's all about mindful shopping. Rather than focusing on fast-fashion outlets, consider buying from sustainable fashion brands which not only use organic, eco-friendly materials but also maintain ethical labor practices. Many online platforms curate stylish, eco-conscious pieces, hence they can be your
18	I spilled coffee on my shirt. Should I just toss it?	Tossing it is wasteful. Better to clean, repurpose, or repair.	Before you consider tossing your shirt, you might want to try removing the coffee stain first. There are many eco-friendly stain removal methods you can try, using natural substances like vinegar or baking soda. That way, you can extend the life of your clothing and reduce waste. However, if the stain doesn't come out, don't just throw the shirt away. You can repurpose it into rags for cleaning the house or donate it to an organization that recycles textiles. It's always a good idea to exhaust all possible options before resorting to just throwing clothes away in order to support a more				go-to for trendy sustainable fashion. (rating: 7/10)

Figure 8. Table of experiment

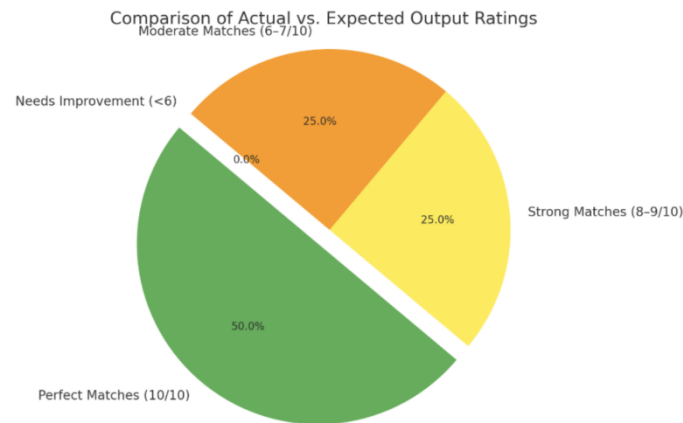


Figure 9. Figure of experiment

The StyleMate AI cannot be strictly classified as “right” or “wrong,” which is why its performance was evaluated relative to another AI system. In this comparison, the other AI tool served as the “expected” output, while StyleMate represented the “actual” output. Overall, StyleMate consistently produced more comprehensive responses, taking into account additional contextual details. Approximately 50% of the responses were nearly identical to the expected outputs, demonstrating the accuracy of the model. The remaining trials showed strong or moderate alignment, with no responses requiring significant correction. This outcome is consistent with the open-ended nature of the queries, where multiple valid interpretations are possible. Instances of moderate alignment primarily resulted from StyleMate providing more extensive information than the comparison model, which, although accurate, was not reflected in the expected output. Nevertheless, these findings indicate the overall accuracy of StyleMate AI and its capability of outperforming other AI models in delivering detailed recommendations.

5. RELATED WORK

The project outlined in this paper is the EU Strategy for Sustainable and Circular Textiles (2022) [13]. They promote the reuse, repair, and recycling of garments. The strategy also holds brands legally accountable for the fate of clothing once consumers no longer use them, prohibits the destruction of unsold or returned garments, and aims for all new clothing produced by 2030 to be primarily composed of recycled or sustainable fibers. The goal of this system and parts of its steps to action are close to mine, as both seek to reduce the consumption of fast fashion and encourage the use of sustainable and recycled clothing. However, a distinctive feature of my application is the digital closet with an eco-rating system. While consumers may be aware of the environmental impact of clothing in general, presenting the impact of their own wardrobe creates a personalized perspective that can more effectively motivate users to adopt sustainable practices, such as donating or repurposing old clothing.

The second project outlined in this research paper is a winter clothing donation for the homeless people of Catanduva with the collaboration of the Family and Community Medicine League, Community Support Group and the Street Clinic [14]. The project aimed to collect clothing, blankets, and financial contributions, which were then distributed to the homeless, while also encouraging contact between medical students and people in social vulnerability. While the initiative shares the goal of assisting the homeless, it differs from my project in several ways. It was a group activity limited to a single winter season, resulting in the collection of over 200 clothing items. Although this is significant, the needs of the homeless extend beyond one season and place. In contrast, my app enables users to donate clothing at any time and to recipients

anywhere, creating a more continuous and impactful system. While donation remains a communal act, it is no longer confined to a single location or event, allowing those in need to receive a steady, ongoing supply of clothing.

The third project described in this paper involved two one-day workshop series held in the UK [15]. Each day simulated different phases of a clothing lifecycle, and the end product was considered slow fashion. Data collected from participants indicated a reduced desire to purchase fast fashion, with a greater inclination toward charity shops and reused items. This shift was due to increased awareness of the labor involved in clothing production and the significant waste generated, which encouraged participants to prioritize reuse and upcycling. This is due to the realization of the labor required and the high amount of waste generated from making clothes, so the people then leaned towards reusing and upcycling clothes. While my system differs in execution, it shares the same overarching goal. Unlike the in-person workshops, my app operates entirely online, promoting higher-quality clothing by letting users know when items are low quality and providing guidance on sustainable alternatives. The StyleMate AI further reinforces this by recommending only sustainable clothing and discouraging fast fashion consumption. In contrast to the limited scope of the workshops, my system reaches a global audience and continuously operates, enabling users to apply sustainable practices at any time in their daily lives.

6. CONCLUSIONS

My project has some limitations related to time and budget, and improvements are ongoing. While the digital closet can store a large number of clothing items, increased usage may raise data storage costs. An ideal version of StyleMate would be able to recommend outfits directly from the user's closet, but loading times currently make this impractical. Nevertheless, it is still a very effective tool. Future developments include an outfits page, allowing users to combine tops, bottoms, shoes, and accessories to plan looks in advance. I also wish to add a tracker on the donations page that can count how to display the number of people that have donated at each location. While there are many potential enhancements, the base version is complete. In hindsight, I might have used Flutter instead of Flutterflow, as my coding experience could have streamlined development. However, I adapted to Flutterflow and gained proficiency, so the choice was ultimately effective.

An experiment was conducted on the AI tool StyleMate to evaluate the accuracy of its responses against expected outputs. Since StyleMate provides recommendations rather than definitive answers, a conventional right or wrong grading scale was not applicable, and a modified one was used. Twenty sample questions representing potential user questions were first answered by a separate AI tool to establish baseline outputs. StyleMate then answered the same questions, with its responses recorded as the actual outputs. While StyleMate's answers were generally longer and more detailed, their content closely matched the expected outputs. ChatGPT was used to rate the similarity between the actual and expected responses on a scale from 1 to 10, with most ratings falling between 8 and 10. These results indicate that StyleMate provides accurate and reliable recommendations, demonstrating the effectiveness of the AI tool in delivering high-quality, context-aware guidance to users.

In conclusion, this research demonstrates that StyleMate, combined with the digital closet and the donations page provides an effective tool for promoting sustainable fashion practices. The AI component delivers accurate and detailed recommendations, as confirmed by experimental evaluation, while the digital closet encourages users to organize and monitor the environmental impact of their personal wardrobes. By integrating personalized guidance with actionable insights, the application addresses key challenges in fast fashion consumption, including

overproduction, waste, and low public awareness of sustainability. Unlike traditional one-time initiatives or localized campaigns, this app offers a continuous, global platform for encouraging clothing reuse, donation, and informed purchasing decisions. Ultimately, StyleMate empowers users to make more environmentally responsible choices, fostering a shift toward sustainable consumption and contributing to a reduction in the social and ecological impacts associated with the fashion industry.

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