SECJ 3553 (02) – ARTIFICIAL INTELLIGENCE

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ASSIGNMENT 1

TITLE: SKINFLEX

GROUP: PIXEL PERFECT

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Problem and AI Solution

Current Problem

Lately, there has been a rise of skincare usage among the youths. The newer generation has been exposed to the importance of skin protection through all social media platforms. This cost the skincare market to grow at such a breakneck rate. A rise in market growth also means the rise in technology usage in skincare. There had been a ton of products that had been created to further help detect skin problems. Currently, the latest technology to determine skin problems may only be used by certified skincare professionals. This results in a high price point for customers as they need to consult with a dermatologist. Alternatively, there are scanners in drugstores used by the salesperson to detect the skin type of customer. These types of scanners are usually inaccurate and give little information of what the user's skin condition requires.

Diagram 1: Skin scanner used by dermatologists.

In the current market, there are many competitors who are striving to manufacture better and more compatible products. The technology and AI had been much more advanced than the previous years.

Applying SkinFlex Program Artificial Intelligence

The solution to this problem is by creating a skin care scanner built in an app where users can easily download it through their phones. Users can use the app to scan their faces through the phone's camera. A diagnosis will be made to determine whether the skin is normal, dry, oily, combination, or sensitive. After ruling out the skin type, the app will then list out the cause of the skin problems and give out skin care product recommendations.

Diagram 2: Skin types.

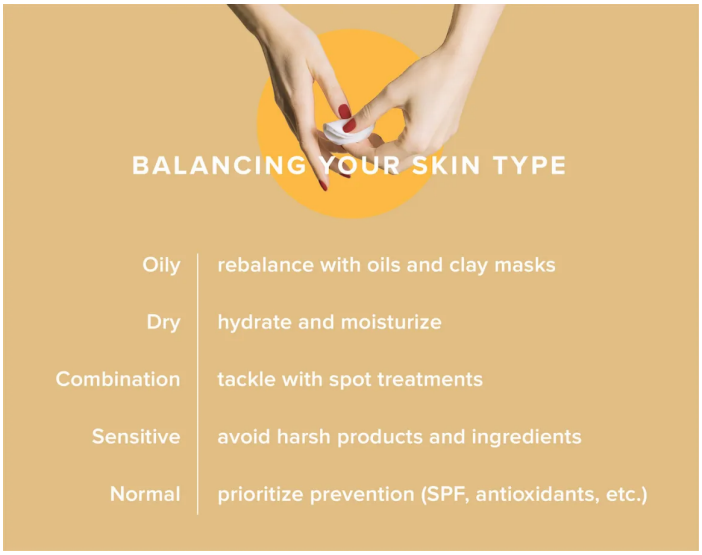

Diagram 3: Example on problems on skin for every skin type.

Having a scanner on a phone is much more convenient and requires less effort and is inexpensive. Users can also retrieve suitable products for their skin based on their budget. The direction is fairly simple. First users need to download the app. Then, scan their faces. Lastly the app program will do all the work to determine skin type, skin condition, skin problem, and suitable skin products to use.

This works by detecting the symptoms of every skin type. If one skin is tight the program will consider it as dry skin. It will also give skin problems such as flaky skin. Lastly the program will conduct a product search to give a suitable product range for users. This applies to all skin types.

Knowledge Representation (KR)

Face_detect, F	Normal_ skin, N	Sensitive_ skin, S	Dry_ skin, D	Oily_ skin, O	Combination_ skin, C
T	T	F	F	F	F
	F	T	F	F	F
	F	F	T	F	F
	F	F	F	T	F
	F	F	T	T	T
F	F	F	F	F	F

KR1:

IF F = **TRUE AND** N = **TRUE AND** S = **FALSE AND** D = **FALSE AND** O = **FALSE AND** C = **FALSE**

KR2:

IF F = **TRUE AND** N = **FALSE AND** S = **TRUE AND** D = **FALSE AND** O = **FALSE AND** C = **FALSE**

KR3:

IF F = **TRUE AND** N = **FALSE AND** S = **FALSE AND** D = **TRUE AND** O = **FALSE AND** C = **FALSE**

KR4:

IF F = **TRUE AND** N = **FALSE AND** S = **FALSE AND** D = **FALSE AND** O = **TRUE AND** C = **FALSE**

KR5:

IF F = **TRUE AND** N = **FALSE AND** S = **FALSE AND** D = **TRUE AND** O = **TRUE AND** C = **TRUE**

KR6:

IF F = **FALSE AND** N = **FALSE AND** S = **FALSE AND** D = **FALSE AND** O = **FALSE AND** C = **FALSE**

Explanation of Knowledge Representation

KR1:

IF F = **TRUE AND** N = **TRUE AND** S = **FALSE AND** D = **FALSE AND** O = **FALSE AND** C = **FALSE**

- When faces are detected and the skin condition is normal, then the skin condition is not sensitive, dry, oily and combination.

KR2:

IF F = **TRUE AND** N = **FALSE AND** S = **TRUE AND** D = **FALSE AND** O = **FALSE AND** C = **FALSE**

- When faces are detected and the skin condition is sensitive, then the skin condition is not normal, dry, oily and combination.

KR3:

IF F = **TRUE AND** N = **FALSE AND** S = **FALSE AND** D = **TRUE AND** O = **FALSE AND** C = **FALSE**

- When faces are detected and the skin condition is dry, then the skin condition is not normal, sensitive, oily and combination.

KR4:

IF F = **TRUE AND** N = **FALSE AND** S = **FALSE AND** D = **FALSE AND** O = **TRUE AND** C = **FALSE**

- When faces are detected and the skin condition is oily, then the skin condition is not normal, sensitive, dry and combination.

KR5:

IF F = **TRUE AND** N = **FALSE AND** S = **FALSE AND** D = **TRUE AND** O = **TRUE AND** C = **TRUE**

- When faces are detected and the skin condition is dry and oily, then the skin condition is not normal and not sensitive but a combination skin.

KR6:

IF F = **FALSE AND** N = **FALSE AND** S = **FALSE AND** D = **FALSE AND** O = **FALSE AND** C = **FALSE**

- When faces are not detected, then the type of skin condition will not be identified.

First-Order Logic (FOL)

KR1:

$\forall(F)((Face\_detect(F) \wedge Normal\_skin(N)) \rightarrow \neg(Sensitve\_skin(S) \vee Dry\_skin(D) \vee Oily\_skin(O) \vee Combination\_skin(C)))$

KR2:

$\forall(F)((Face\_detect(F) \wedge Sensitve\_skin(S)) \rightarrow \neg(Normal\_skin(N) \vee Dry\_skin(D) \vee Oily\_skin(O) \vee Combination\_skin(C)))$

KR3:

$\forall(F)((Face\_detect(F) \wedge Dry\_skin(D)) \rightarrow \neg(Normal\_skin(N) \vee Sensitve\_skin(S) \vee Oily\_skin(O) \vee Combination\_skin(C)))$

KR4:

$\forall(F)((Face\_detect(F) \wedge Oily\_skin(O)) \rightarrow \neg(Normal\_skin(N) \vee Sensitve\_skin(S) \vee Dry\_skin(D) \vee Combination\_skin(C)))$

KR5:

$\forall(F)((Face\_detect(F) \wedge Oily\_skin(O) \wedge Dry\_skin(D) \wedge Combination\_skin(C)) \rightarrow \neg(Normal\_skin(N) \vee Sensitve\_skin(S)))$

KR6:

$\forall(F)(\neg(Face\_detect(F)) \rightarrow \neg(Normal\_skin(N) \vee Sensitve\_skin(S) \vee Oily\_skin(O) \vee Dry\_skin(D) \vee Combination\_skin(C)))$

Knowledge Representation Involved to Achieve Goals

1. The first goal is to make sure the AI is able to recognize human beings as the subject. With the manipulation carried out by Face_detect, F, which will detect human beings' faces. The result can go either F = True or F = False.

2. Helps to make decisions on what type of skin the individual possesses. Most people never know their skin type even when they have grown older. By manipulating the Normal_skin, N, Sensitive_skin, S, Dry_skin, D, Oily_skin, O, and Combination_skin, C, the application is capable of detecting the type of skin of the individual. To know the type of skin, the possibilities are:
    a) If N = True, it means they have normal skin, else, if N = False, it means the opposite
    b) If S = True, it means they have sensitive skin, else, if S = False, it means the opposite
    c) If D = True, it means they have dry skin, else, if D = False, it means the opposite
    d) If O = True, it means they have oily skin, else, if O = False, it means the opposite
    e) If C = True, it means they have combination skin, else, if C = False, it means that they does not have combination skin