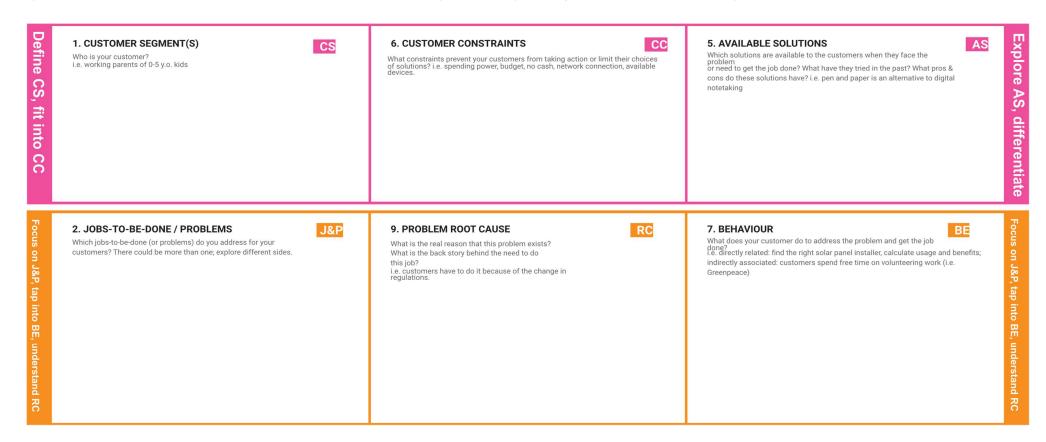**Project Title: AI based localization and classification of skin disease with Erythema   Project Design Phase-I - Solution Fit Template   Team ID: PNT2022TMID42059**

Define CS, fit into CC

1. CUSTOMER SEGMENT(S)   `CS`

Who is your customer?
i.e. working parents of 0-5 y.o. kids

6. CUSTOMER CONSTRAINTS   `CC`

What constraints prevent your customers from taking action or limit their choices of solutions? i.e. spending power, budget, no cash, network connection, available devices.

5. AVAILABLE SOLUTIONS   `AS`

Which solutions are available to the customers when they face the problem
or need to get the job done? What have they tried in the past? What pros & cons do these solutions have? i.e. pen and paper is an alternative to digital notetaking

Explore AS, differentiate

Focus on J&P, tap into BE, understand RC

2. JOBS-TO-BE-DONE / PROBLEMS   `J&P`

Which jobs-to-be-done (or problems) do you address for your customers? There could be more than one; explore different sides.

9. PROBLEM ROOT CAUSE   `RC`

What is the real reason that this problem exists?
What is the back story behind the need to do this job?
i.e. customers have to do it because of the change in regulations.

7. BEHAVIOUR   `BE`

What does your customer do to address the problem and get the job done?
i.e. directly related: find the right solar panel installer, calculate usage and benefits; indirectly associated: customers spend free time on volunteering work (i.e. Greenpeace)

Focus on J&P, tap into BE, understand RC

1.Customer Segment

Our 2-phase analysis model for localization and classification is shown via the pseudocode in Algorithm. We decomposed the original image into its haemoglobin and melanin constituents using pre processing, to help our model extract valuable information from data that would have been otherwise unavailable.

2.Customer Constraints

We provide these images as input to our segmentation model, the UNet, which generated a segmented image.

3.Available solution

Segmented image was then analysed for clusters, which were subsequently cropped and input to our classification model, the Efficient Net, which then produced a classified label, thus completing our analysis model.

4.Jobs to be done/ Problems

The site provides open source images with labels. We selected 18 top-level categories each of which included enough data, besides including erythema as one of its common symptoms. Using a web crawler, we gathered a total of 15,851 images.

5.Problem Root cause

Among the images obtained through Denet, the erythema of 100 images was masked by dermatologists, to be used as a ground truth. For segmentation, 60 images were used for training, and 40 images were used for testing.

6.Behavior

One of the significant merits of the Denet dataset is that it was created and is maintained by a diverse group of dermatologists. The images in each top-level category are independent as they are images of different patients at distinct locations taken with varying devices. This is evident in the diverse resolutions, lighting, and aspect ratios of the images. Regardless, it would be optimal to possess a similar dataset from an entirely separate association to truly validate the performance of our model.