BIAS IN AI DIAGNOSIS OF MELANOMA

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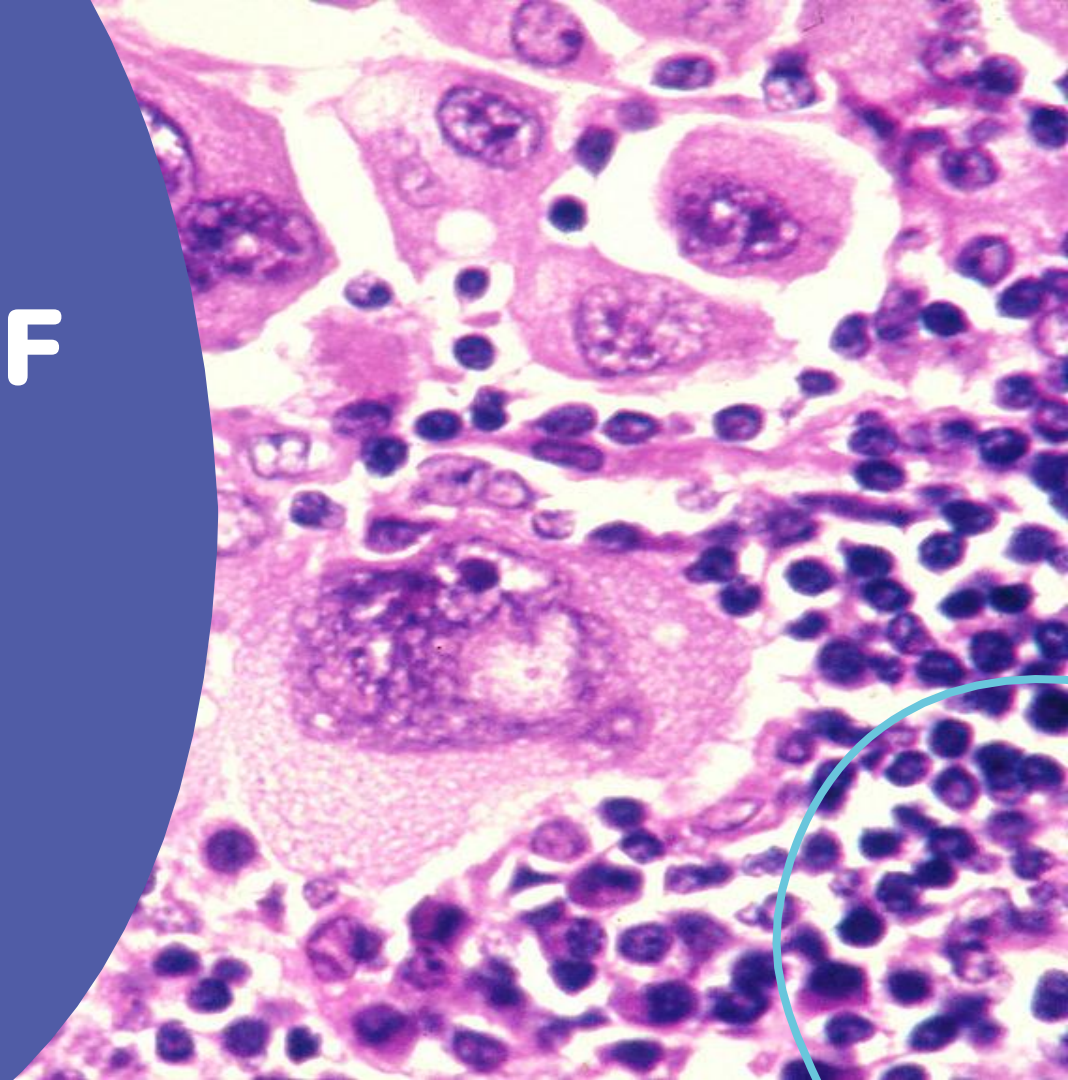
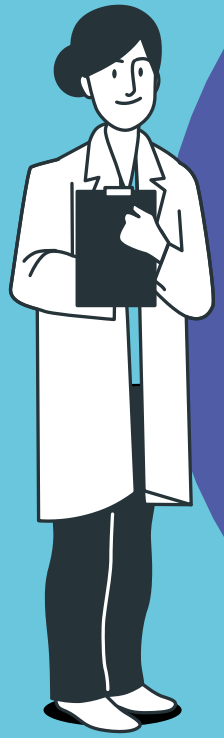
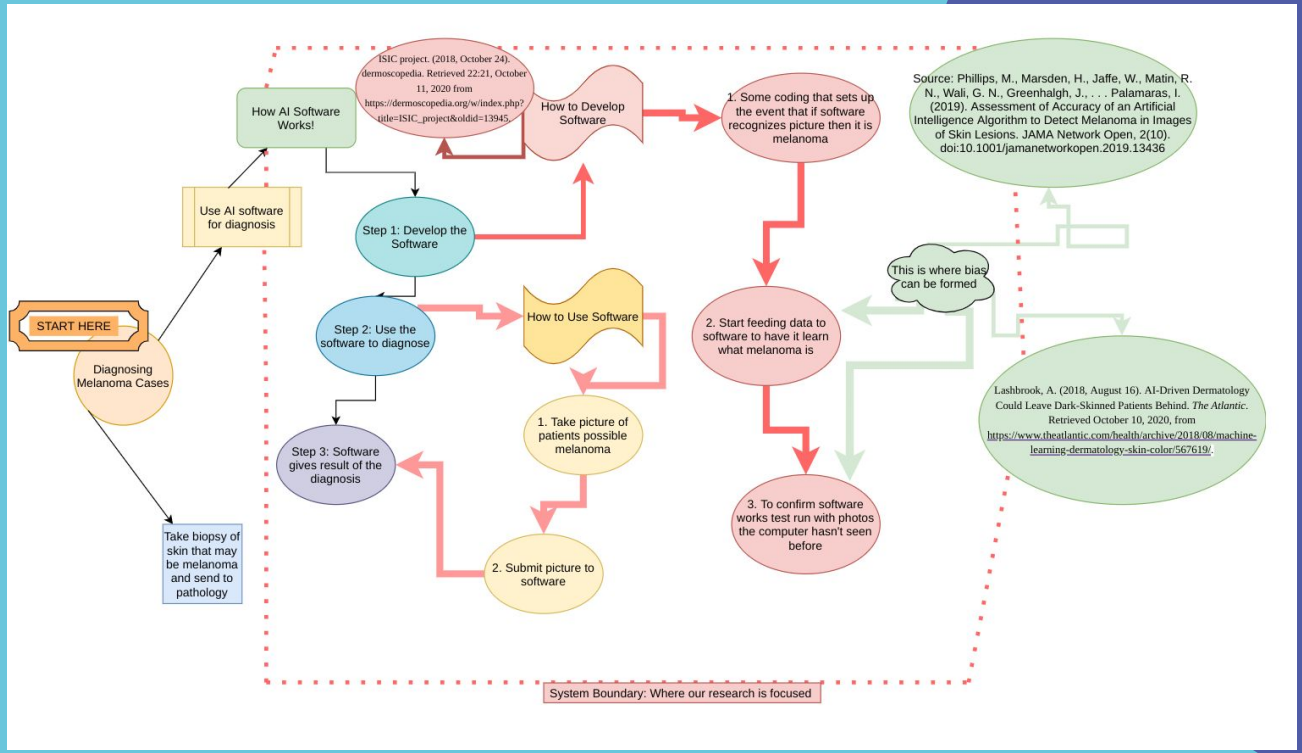




INTRODUCTION

The bias product we found for our project stems from the International Skin Imaging Collaboration (ISIC)’s efforts with academia and industry to improve detection methods of melanoma through the use of digital skin imaging technologies. Bias was found in these artificial intelligences’ diagnosis processes of digital skin imaging.

CONCEPTUAL MODEL



The way the current engineering product works is through inputting images from a smartphone into the AI system, through the AI's learning and practice (its database) it evaluates the image and creates a diagnosis output

Bias can be found in the learning and testing phase of the product

ANALYSIS OF BIAS

50/50? **Bias in creation**

There is too much room for bias in creating the AI, engineers could train bias into the AI system accidentally

94.2% **Bias in testing**

When testing for accuracy of the AI, did not have accurate representation of patient population

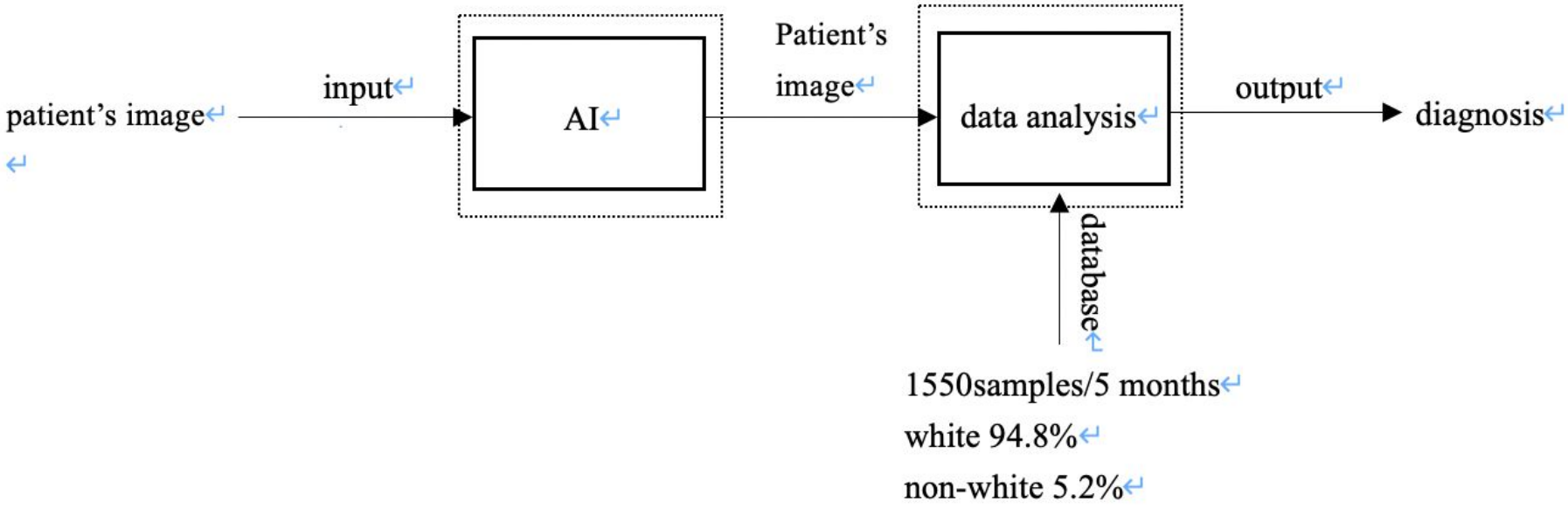
84% **Elaboration**

The actual patient population using this AI should be this percent non-white, creating the AI should account for this population

16% **Elaboration**

The actual patient population this AI would be used for is only 16% white

REPRESENTING BIAS



Closed, non-reactive system at steady state

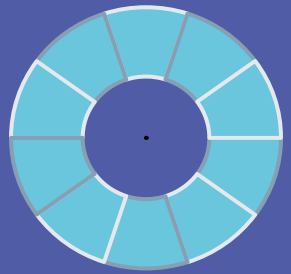
acc =in-out+generated-consumed

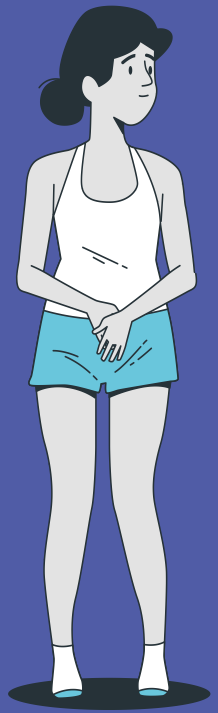
acc = in - out

HOW CAN WE IMPROVE?

Imaging Data

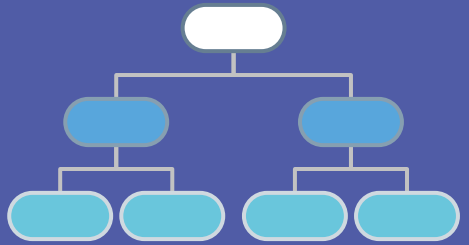
Create more diverse pools



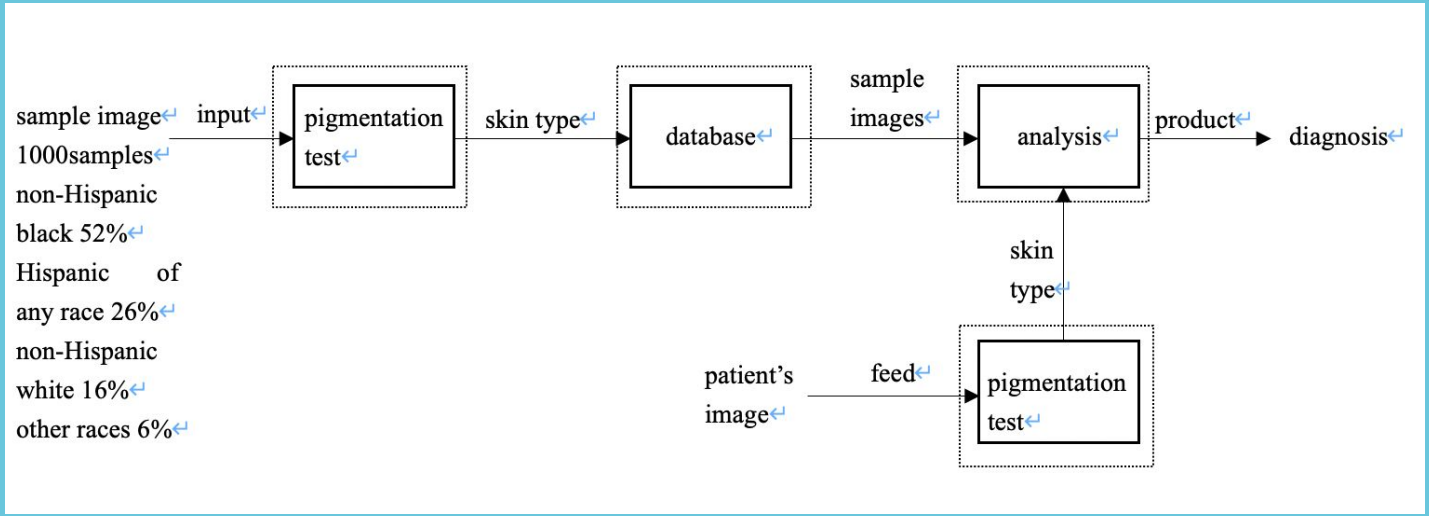


Categorizing Images

Skin tone recognition



OUR SOLUTION



Database system & analysis system: closed, non-reactive, at steady state

acc =in-out+generated-consumed

acc = in - out

TESTING FOR PIGMENTATION

3.00x10⁸ m/s

Input

- UV radiation

SKIN

radiation/8 days

Output (absorption)

- UV radiation

PIGMENTATION BALANCES

Assumptions: open, steady state, reactive

Accounting Equation

$$acc = in - out + gen. - con.$$

$$0 = in - out + v\xi$$

$$0 = UV_{[IN]} - UV_{[OUT]} + v\xi$$

$$UV_{[OUT]} - UV_{[IN]} = v\xi$$

Energy Balance

$$\triangle (U+KE+PE)_{sys} M_{sys} = (H+KE+PE)_{in} M_{in} - (H+KE+PE)_{out} M_{out} + Q + W$$

$$\cancel{\triangle (U+KE+PE)_{sys} M_{sys}} = (H+\cancel{KE}+\cancel{PE})_{in} M_{in} - (H+\cancel{KE}+\cancel{PE})_{out} M_{out} + Q + \cancel{W}$$

$$0 = (H)_{in} M_{in} - (H)_{out} M_{out} + Q$$

$$(H)_{out} M_{out} - (H)_{in} M_{in} = Q$$

FIN