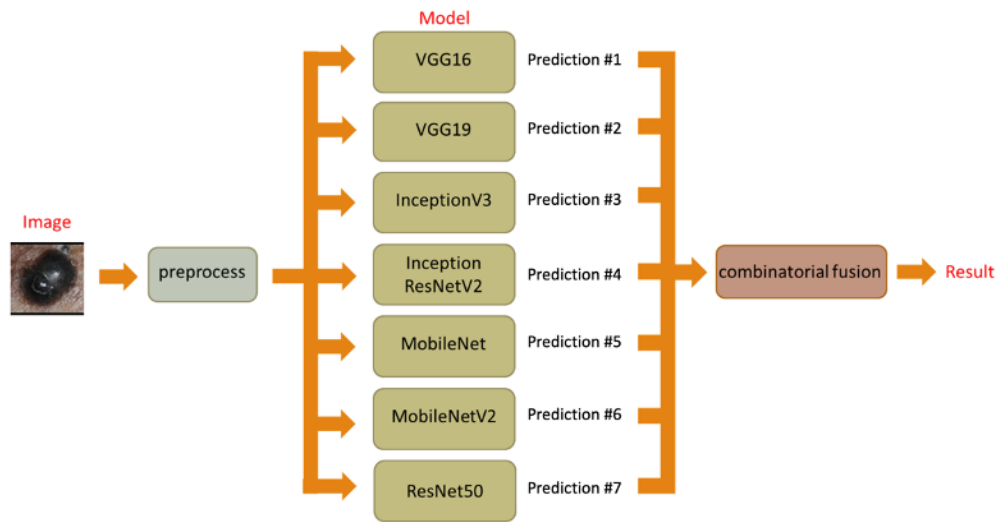
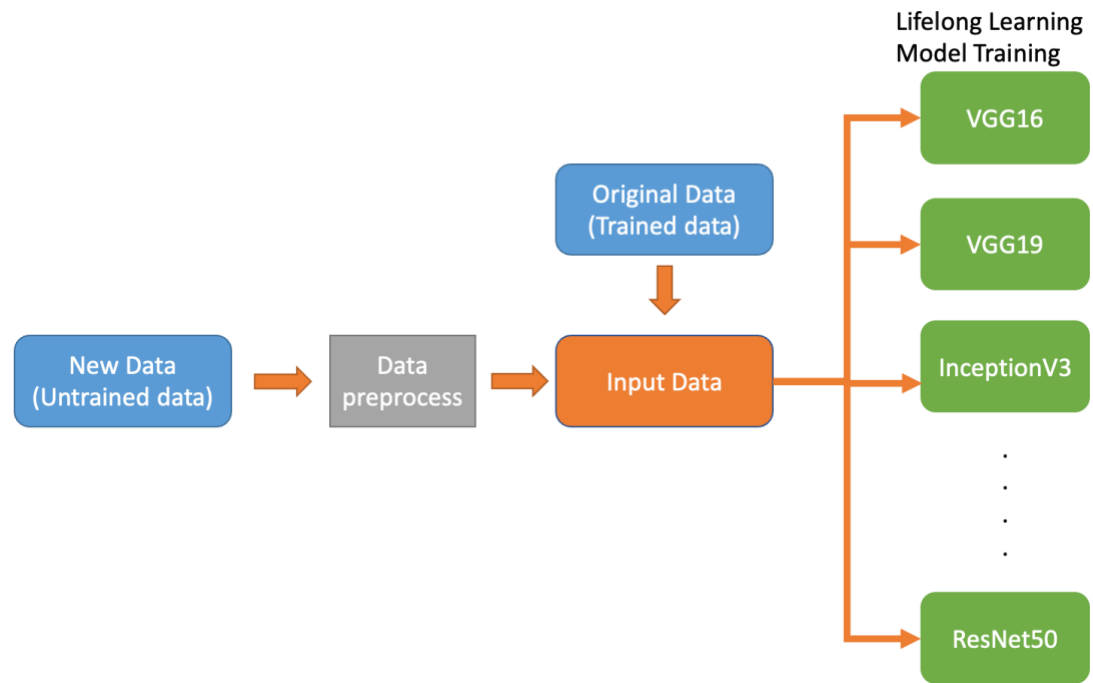


Supplementary Figure 1. The system architecture of SKinFLNet.



Supplementary Figure 2. Procedure of Lifelong Learning

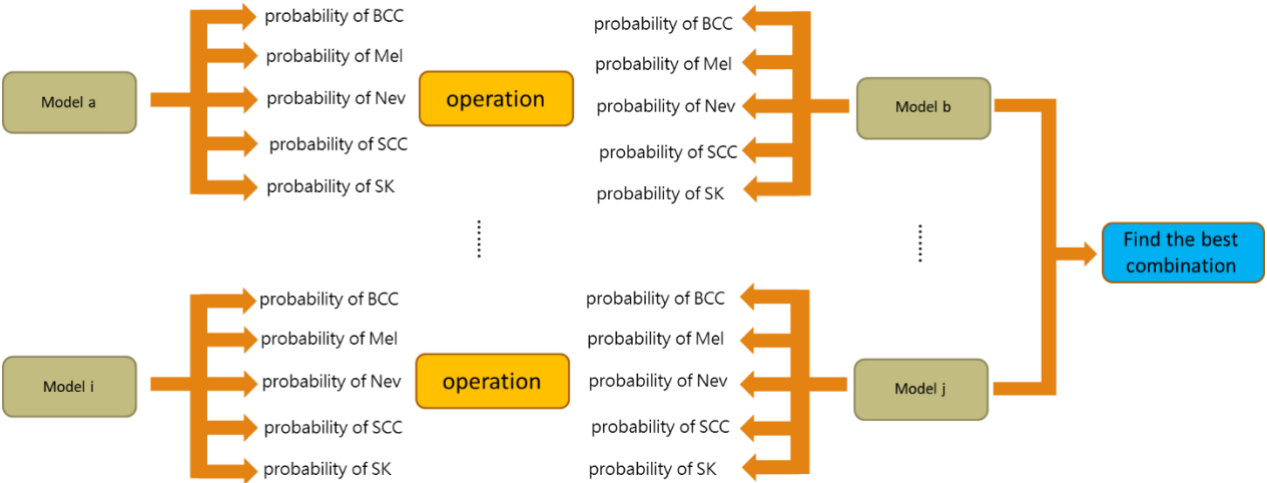


Supplementary Figure 3. Algorithm of Lifelong Learning

Algorithm Lifelong learning

```
1: require: 2 CNN models selected after
   combinatorial fusion ( $CNN\_model_{cf\_list}$ )
2: require: untrained new dataset (
    $dataset_{untrained}$ )
3: require: original dataset (
    $dataset_{original}$ )
4: input:  $dataset_{untrained}$  and  $dataset_{original}$ 
5: for  $i$  in  $dataset_{untrained}$ 
6:    $I_{untrained\_aug} = Rotate(I_i)$ 
7:    $I_{untrained\_res} = Resize(I_{untrained\_aug})$ 
8:   # Augment the images so that the
   number of images in each category is
   the same.
9:    $I_{ori\_random} = Random(dataset_{original})$ 
10:  #Randomly select image from  $dataset_{original}$ 
11:   $I_{train} = Mix(I_{untrained\_res}, I_{ori\_random})$ 
12:  #Mix  $I_{untrained\_res}$  and  $I_{ori\_random}$  together
   in a 1:1 ratio to become a new
   training dataset
13: for  $i$  in  $CNN\_model_{cf\_list}$ 
14:   for  $epoch = 0, \dots, N_{epoch}$  do
15:      $model_{cfi}(I_{train})$ 
16:   end for convergence
17: output:  $model_{continuous\_list}$ 
```

Supplementary Figure 4. Procedure of Combinatorial Fusion of Models for Skin Cancer Classification



Supplementary Figure 5. Algorithm of Combinatorial Fusion

Algorithm Combinatorial Fusion

```
1: require: augment and resize images
2: require: trained_CNN_model_list [VGG16, VGG19,
    InceptionResNetV2, InceptionV3, ResNet50, MobileNet,
    MobileNetV2]
3: input: training image ( $I_{res}$ )
4: for i in trained_CNN_model_list
5:     prediction[i] = net.predict( $I_{res}$ )[0]
6: result = F1(prediction)
7: # The F1 function is the sum of the absolute values
    obtained by subtracting any two non-repeating values.
8: combination = find_max(result)
9: # Find the combination with the largest 'result' value
10:  $Predition_{mean}$  = mean(combination)
11: # mean predicted value for this combination
12: output:  $Predition_{mean}$ 
```
