

# USING ARTIFICIAL INTELLIGENCE AND DEEP LEARNING FOR EARLY DIAGNOSIS AND PREVENTION OF PERIODONTAL DISEASE.

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## Purpose and Utilisation of AI in everyday dental offices.

In order to diagnose and treat periodontal disease sooner, dentists and dental hygienists may choose to analyse dental photos and data more accurately with the use of AI-based software; as radiological interpretation may be subjective and impacted by individual variables including weariness, attention, and personal biases, even the most skilled dentists might overlook features on a radiograph. This means that the likelihood of a dentist missing a prominent detail when studying a radiograph is increased.

The total outcome of using deep learning models to prevent and recognize signs of early periodontal disease would mean to make headway towards improving patients' oral health, general health, and quality of life.

## Data Processing, Model Training and Development process.

**Data collection.** Panoramic dental radiographs from a public source were collected, a group of them illustrating signs of periodontal disease and the other group displaying adequate oral health.

### Data preprocessing.

This step includes preparing the data for the AI model that have will later be trained to detect certain characteristics in dental radiographs. the purpose of this process is to aid in *standardizing pictures, enhancing pertinent characteristics, and removing any noise* that would hinder the model's capacity to identify the patterns such as inflammation, bone loss, loose teeth, or general discontinuity in oral health that can lead to periodontal disease.

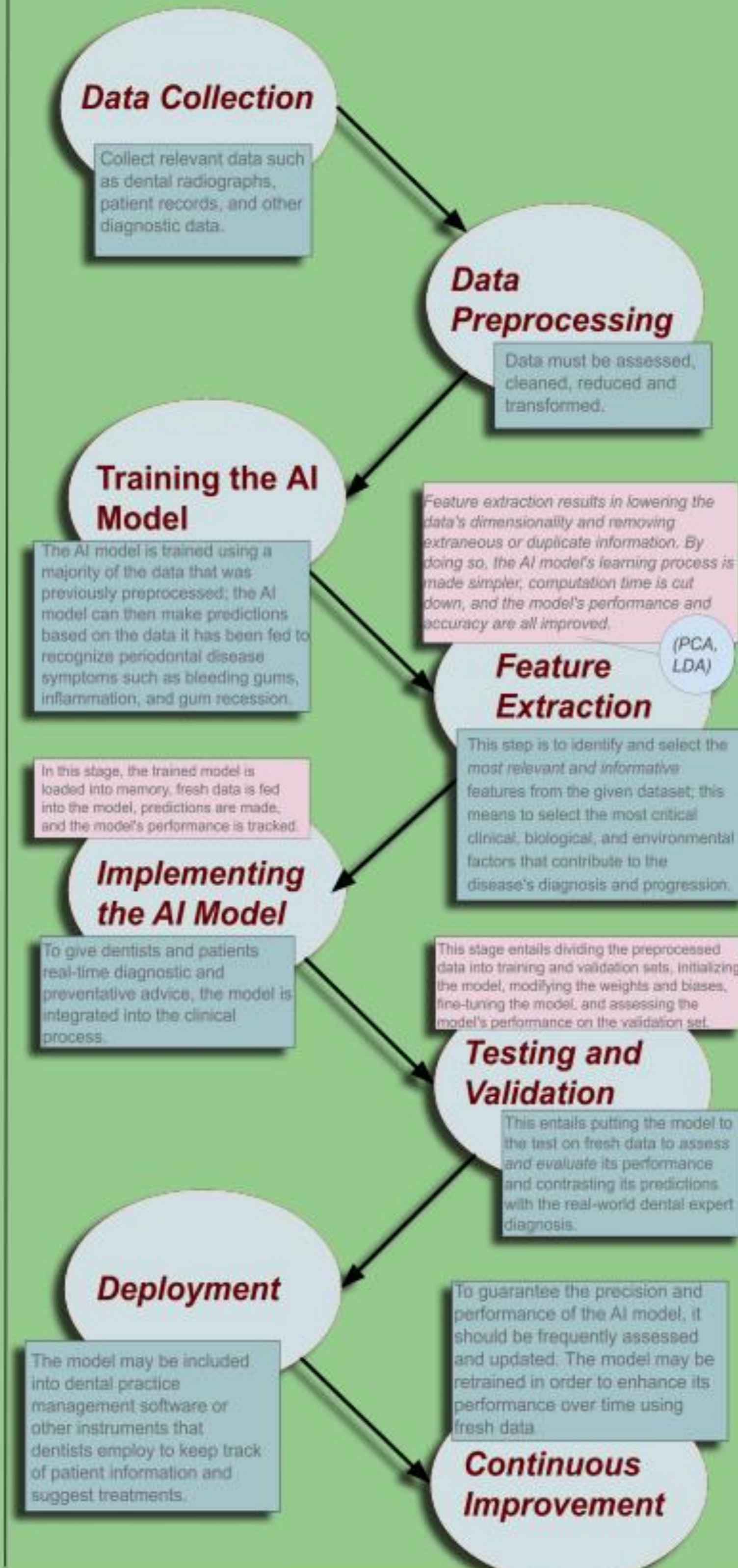
### AI Model Compilation.

This step establishes the foundation for training the neural network model.

- A pre-trained MobileNetV2 model is used to create a neural network model, the pre-trained model also functions as a *feature extractor*.
- Built on top of the pre-trained model are additional layers; the three substantial new layers (fig1.2) are made out of *SELU activation functions* and *dropout layers* to avoid overfitting, the last dense layer employs a *sigmoid activation function*.



## summary of the deep learning process.



Pre-trained AI model  
(Keras MobileNetV2)

SELU activation function  
Dropout layer  
Sigmoid activation function

### 1.2 Compiled AI model.

### Training the Model.

The characteristics produced from the pre-trained model are used to train the model on a specific dataset of dental panoramic radiographs.

### Testing, validating and evaluation.

The model is then expected to be tested and validated on a separate dataset, called the validation set, to assess its performance. After running the validation set for 20 epochs, the validation accuracy is seen to be at 80% and the general accuracy is seen to be at 70%.

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Model Evaluation
1/1 [-----] - 3s 3s/step - loss: 0.4782 - accuracy: 0.8000 - recall: 0.8000
  
```

### Future developments and conclusion.

Further data collection and retraining would be practiced in order to expand the model.



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Thanks for joining us!

