

# iMedBot System User's Manual

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## 1. Introduction

- 1.1 Breast cancer is a multifactorial disease, genetic and environmental factors will affect its incidence probability. Breast cancer metastasis is one of the main causes of breast cancer-related deaths reported by the American Cancer Society (ACS).
- 1.2 The iMedBot can provide two primary services: 1. It can predict 5-, 10-, or 15-year breast cancer metastasis based on a set of clinical information provided by a user. The prediction is done using a set of DFNN models that were trained, and 2. It can train DFNN models for a user using user-provided datasets. The model trained will be evaluated using AUC and both the AUC value and the AUC ROC curve will be provided.
- 1.3 The iMedBot web application provides a user-friendly interface for user-agent interaction in conducting personalized prediction and model training. It is an initial attempt to convert the results of deep learning research into an online tool that may stir further research interests in this direction.

## 2 Registration System

The official website is directed to: <http://imedbot.odpac.net/>

### 2.1 Sign-up Page

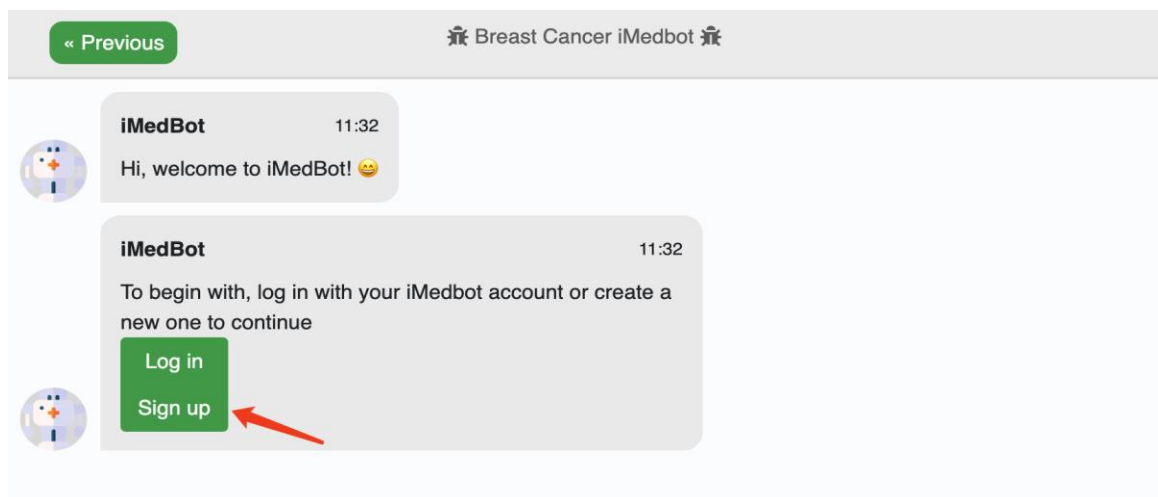
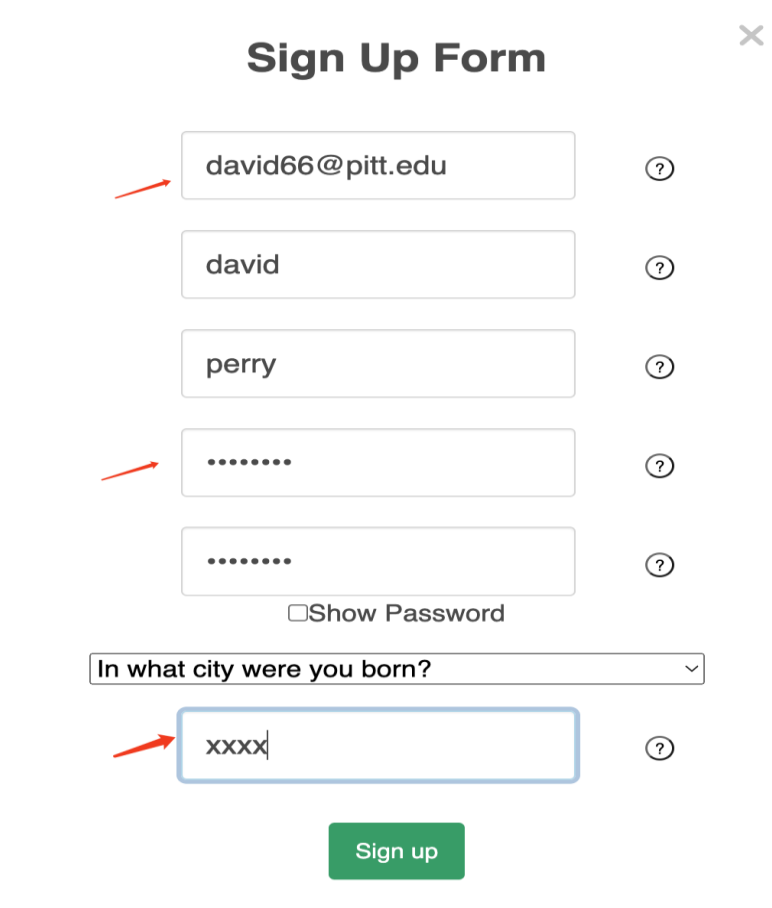


Fig. 1

- 1) Once logged into the website home page, click sign up bottom, you will be directed to the sign-up page.
- 2) Please follow the sign-up instruction and fill out the information needed.



The image shows a 'Sign Up Form' with a close button (X) in the top right corner. The form contains several input fields, each with a red arrow pointing to it and a help icon (question mark in a circle) to its right. The fields are: an email field containing 'david66@pitt.edu', a first name field containing 'david', a last name field containing 'perry', a password field containing seven dots, a second password field containing seven dots, a checkbox labeled 'Show Password', a dropdown menu labeled 'In what city were you born?' with a downward arrow, and a city field containing 'xxxx'. At the bottom of the form is a green 'Sign up' button.

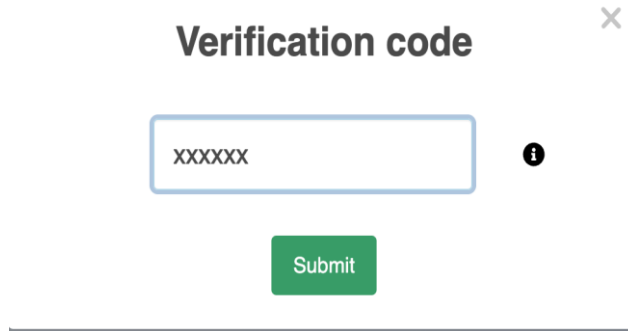
Fig. 2

- 3) Waiting for the verification code sent to you and filling it up.

**We have send an verification email to your address, please check it. ( check the junk mail or review your quarantined messages if you cannot find the verification message in your mailbox)**

OK

Fig. 3



A screenshot of a verification code screen. At the top, the text "Verification code" is displayed in a bold, dark font, with a small "X" icon to its right. Below this, there is a white rectangular input field containing the text "XXXXXX". To the right of the input field is a small circular icon with an "i" inside. Below the input field is a green rectangular button with the text "Submit" in white. The entire form is centered on a light gray background.

Fig. 4

- 4) Once you submit the verification code, your account will be available to use.

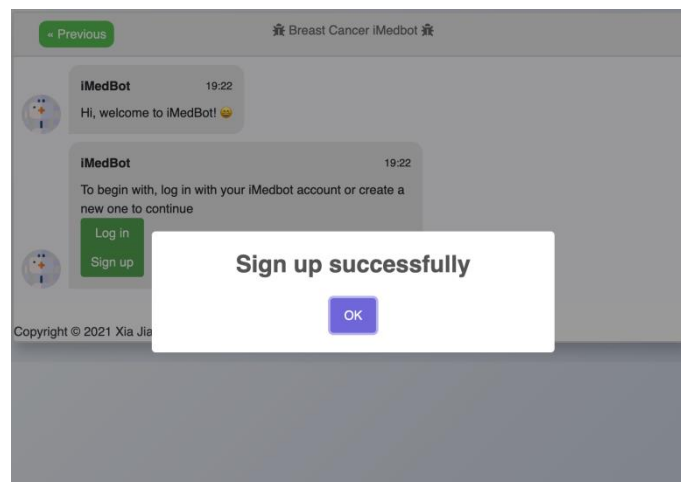


Fig. 5

## 2.2 Login page

- 5) Once you have registered the account, you have to log into the system to use it.

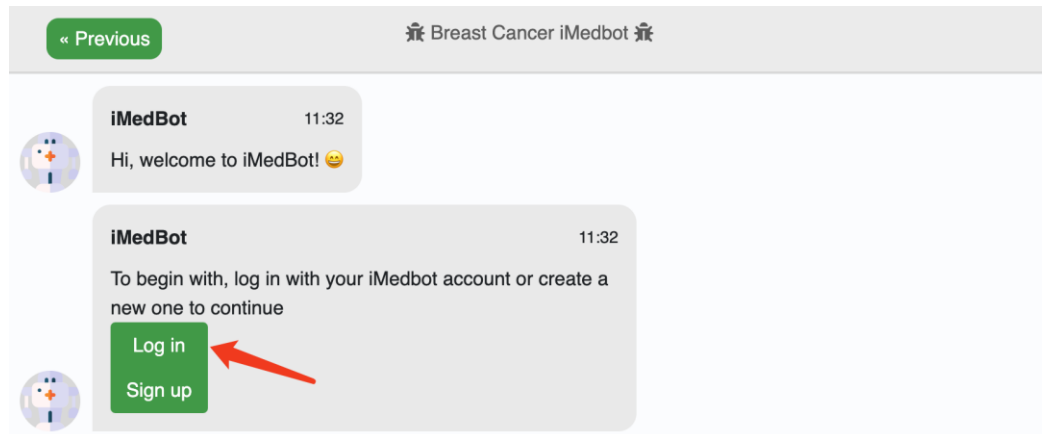


Fig. 6

- 6) Enter the username and password to log in.

## Login Form

[Forgot password?](#)

Fig. 7

- 7) Once you receive the pop-up message, you will look into the dashboard.

## Log in successfully

Fig. 8

- 8) Now, you can use our system to do prediction or model training.

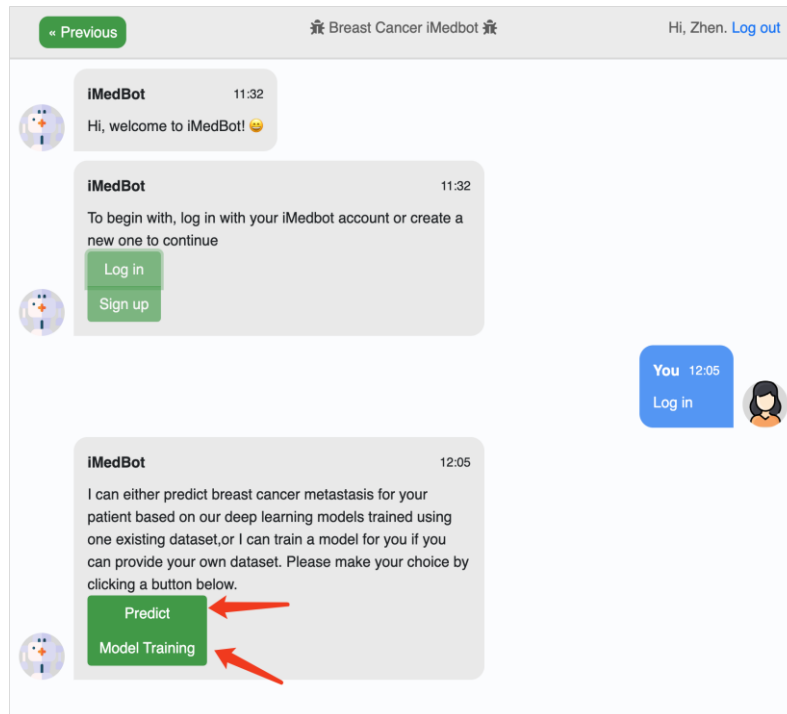


Fig. 9

### 2.3 Log out

9) Click the greeting sentence in the upper right corner.

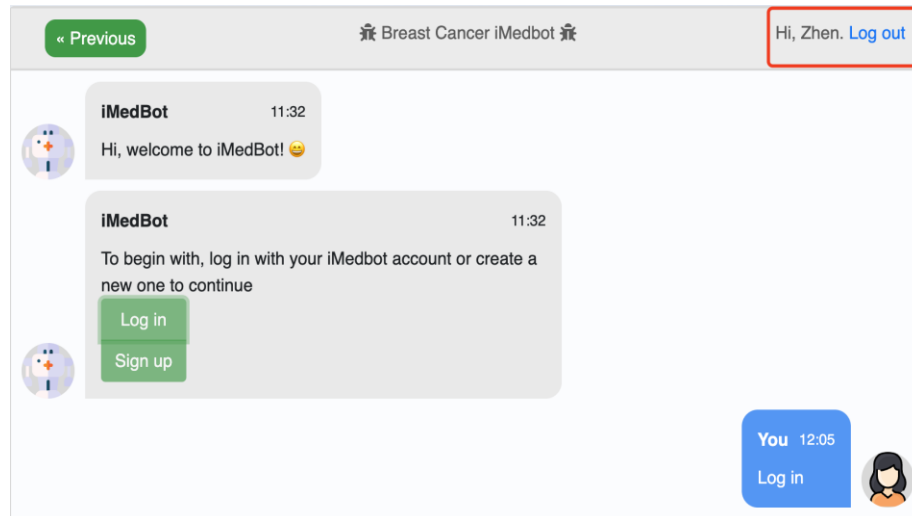


Fig. 10

10) Once you click it, the pop-up window shows that you have successfully logged out, then you are good to go.

**You have successfully logged out.**

OK

Fig. 11

## 3 Predict System

The Predicting module can predict breast cancer metastasis for your patient based on deep-learning models trained by the iMedBot system using one existing dataset.

11) Click Predict after logging into the system.

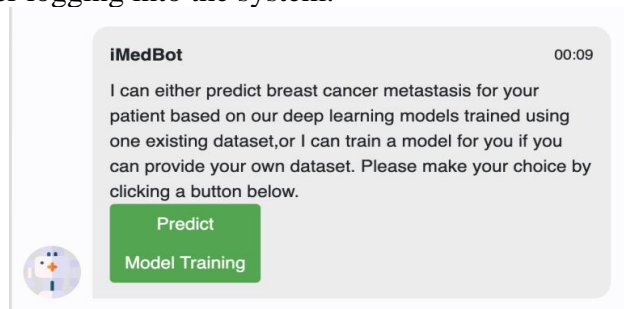


Fig.12

- 12) Choose the year. There are 3 choices that are 5-year, 10-year, and 15-year. Each year has a different number of questions and the choices will be predicted by other models.

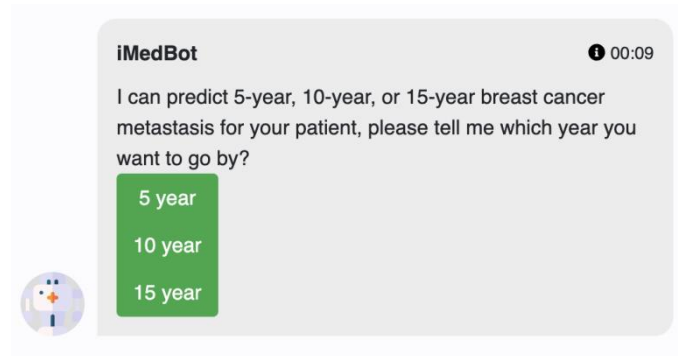


Fig. 13

- 13) Select Predictors

There is an explanation for the predictor when you hover around the link.

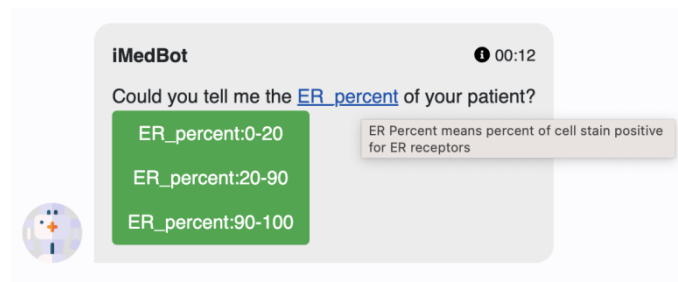


Fig. 14

For some complex choices, there are explanations when you hover around the buttons.

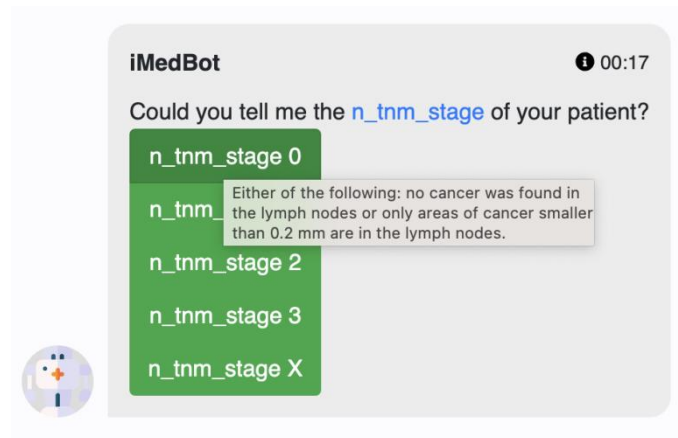


Fig. 15

- 14) Check the results.

After you finish choosing, the system will return the probability of breast cancer metastasis of corresponding year.

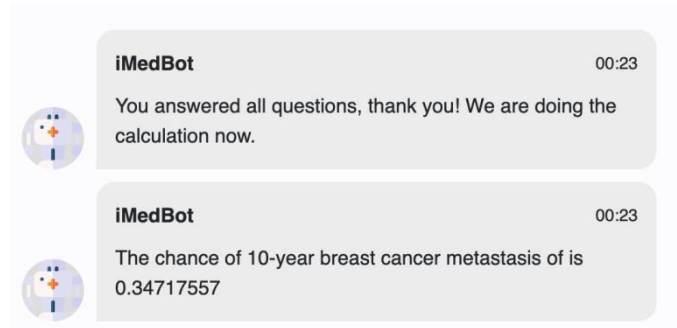


Fig. 16

15) Predict another patient.

After finishing predicting one patient, you can choose to predict another one or end the task.

a) Predict another patient:

You need to choose the year for another patient and repeat the process above.

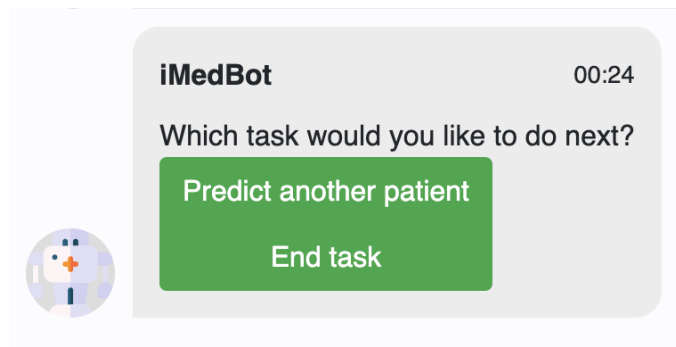


Fig. 17

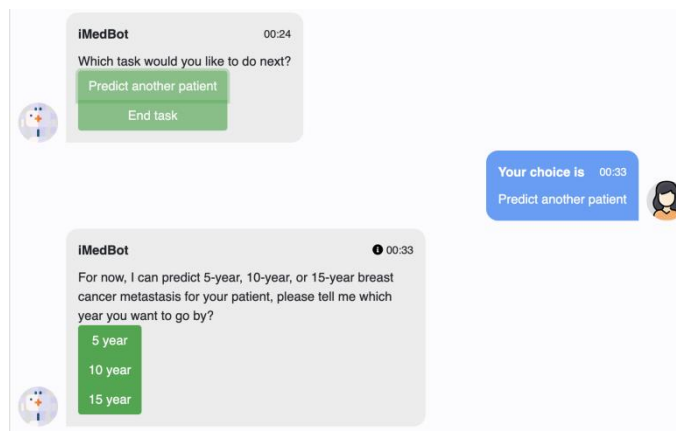


Fig. 18

b) End task:

You will need to choose whether to take a survey. If you choose yes, please refer to the survey system. If you choose no, the website will refresh and go to the initial state.

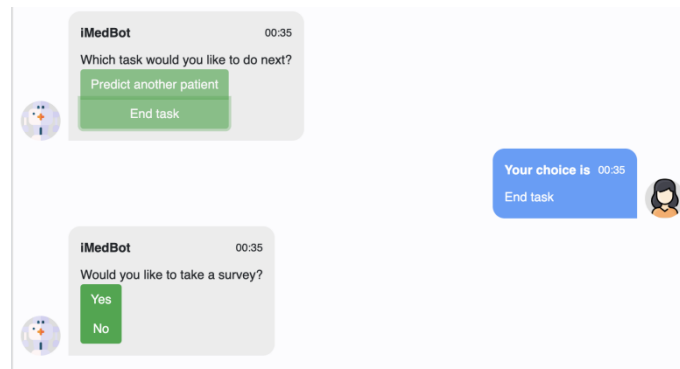


Fig. 19

## 4 Model Training System

It will use 80% of your dataset to train this model with 5 fold cross validation strategies and 20% dataset as validation dataset to return the validation AUC.

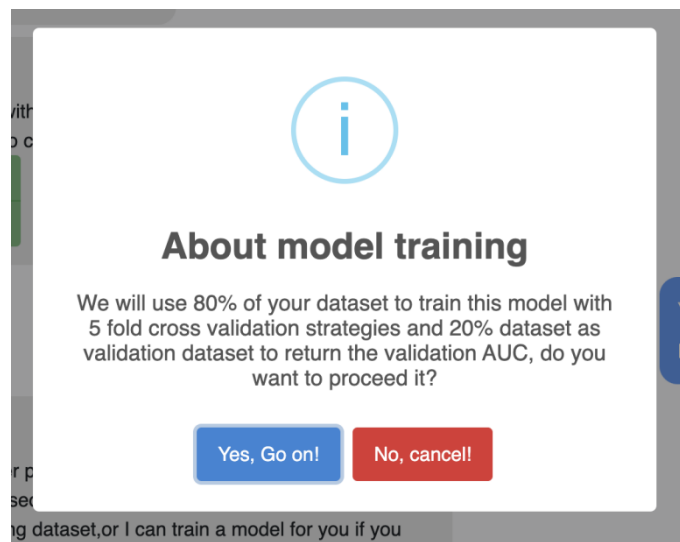


Fig. 20

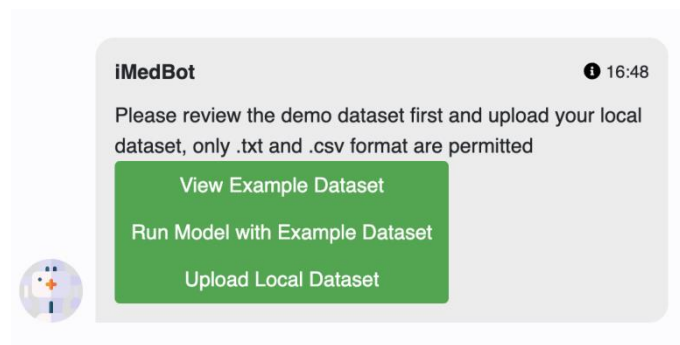


Fig. 21



#### 4.1 View example dataset

Click view example dataset and you will see the instructions about datasets for model training.

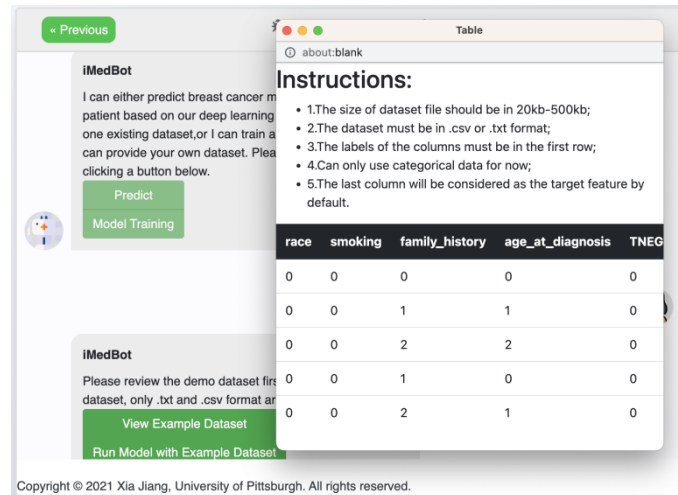


Fig. 22

#### 4.2 Run model with an example dataset.

16) Click run model with an example dataset.

17) Choose whether to use our default parameter setting to train the example dataset.

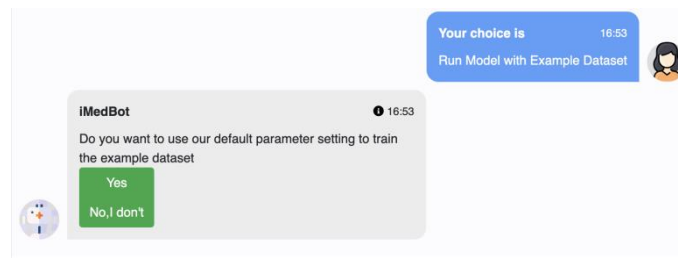


Fig. 23

a) Use the default parameter setting.

After choosing this you will see the list of parameters and an explanation will be provided when hovering around the parameter names.

If you choose to change your mind, the system will redirect to user-defined parameter setting.

If you choose yes, the model begins training. Wait until the system returns the results.

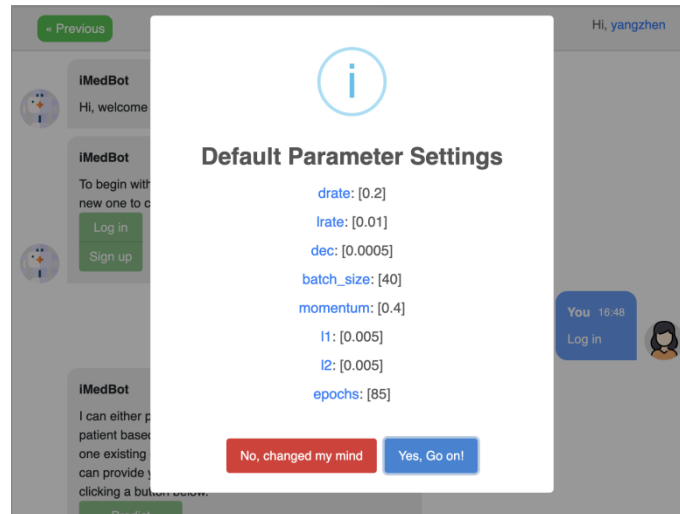


Fig. 24

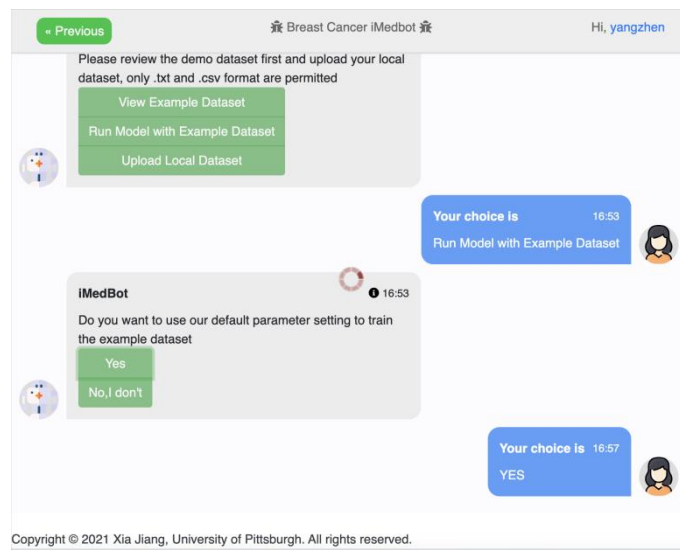


Fig. 25

- b) Use user-defined parameter setting.

You can input the parameters by yourself. There will also be explanations for the name of parameters when hovering around. Click submit and wait for the training process.

for model training

Learning Rate

Batch Size

Epoch

Decay

Dropout Rate

Momen

L1

L2




Fig. 26

Size

Epoch


Decay

Dropout Rate

Momen

L1

L2




Your choice is 17:12  
Get the parameter for example dataset 

Fig. 27

c) See the training result.

It will show the validation AUC value and validation ROC\_curve plot.  
And explanation of AUC\_ROC will be provided if you are not familiar  
with it.

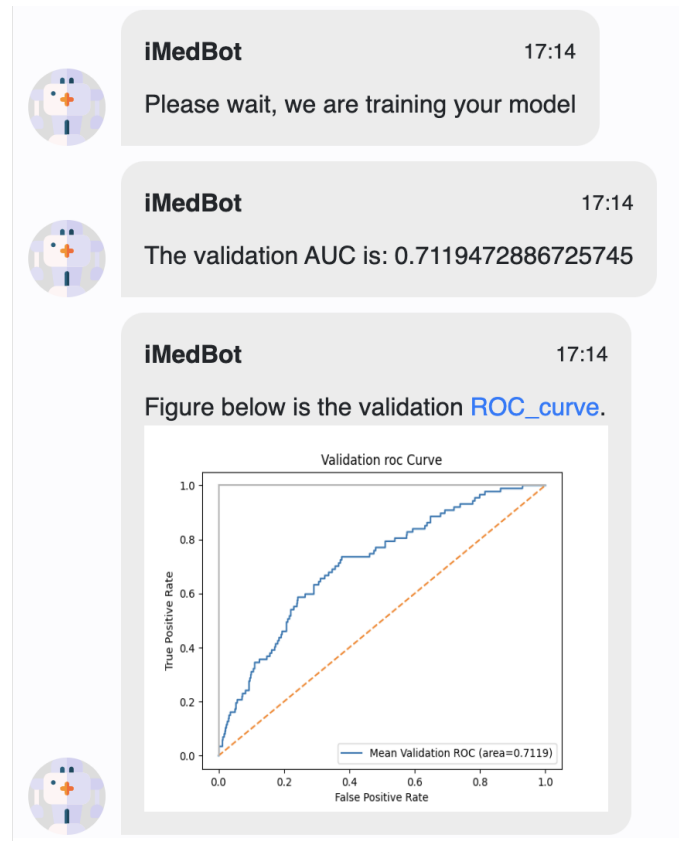



Fig. 28

### 4.3 Upload local dataset.

18) Click upload local dataset.

19) Read the instructions for the dataset and confirm.

If the uploaded dataset does not meet the requirements, the file will be rejected, and you need to re-upload the file.



**Instructions for dataset**

- The size of dataset file should be less than 500kb;
- The dataset must be in .csv or .txt format;
- The labels of the columns must be in the first row;
- Can only use categorical data for now;
- The last column will be considered as the target feature by default.

Fig. 29

20) Choose the dataset file and upload.

Select the dataset file you want to upload in your local file system and open the file.

Then the dataset file will be uploaded to the system.

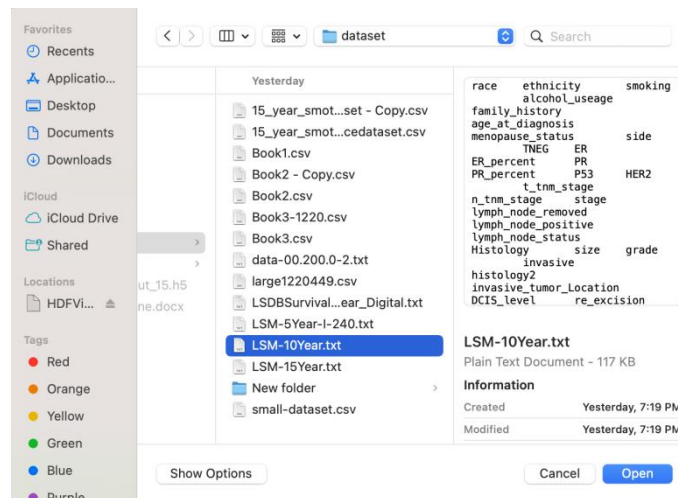


Fig. 30

21) View the information of your dataset.

There will be a pop-up window to show your dataset in the form format and information about your dataset in the text format.

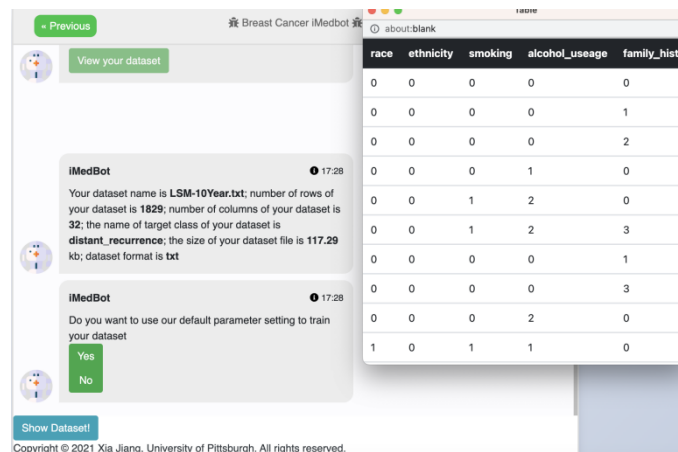


Fig. 31

22) Choose whether to use our default parameter setting to train the example dataset.

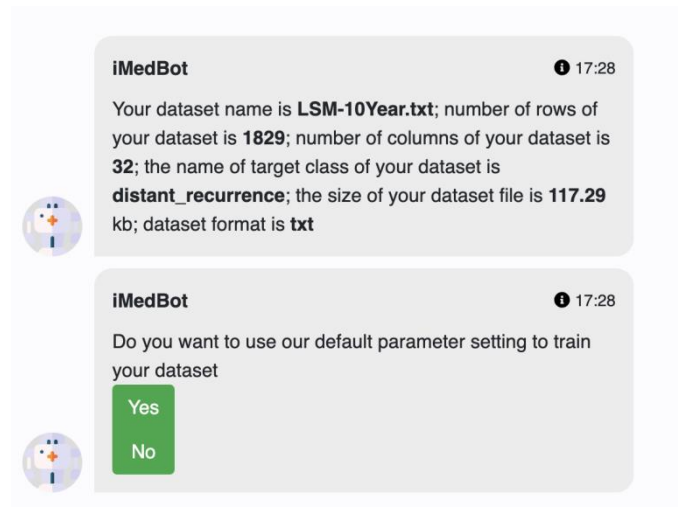


Fig. 32

- a) Use the default parameter setting.

After choosing this you will see the list of parameters and an explanation will be provided when hovering around the parameter names.

If you choose to change your mind, the system will redirect to the user-defined parameter setting.

If you choose yes, the model begins training. Wait until the system returns the results.

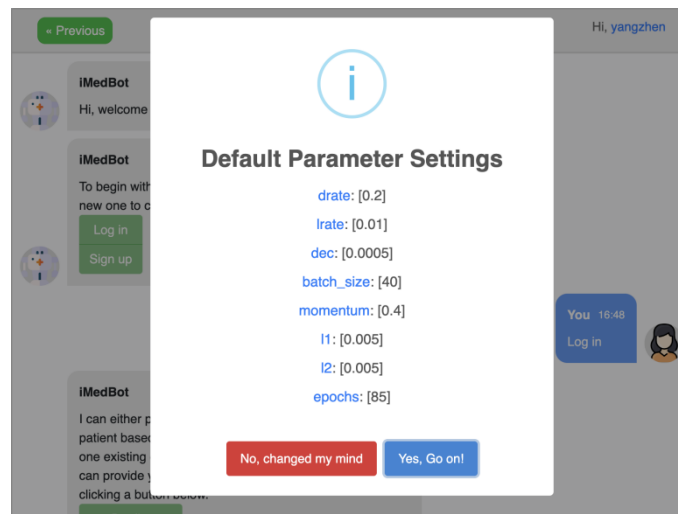


Fig. 33

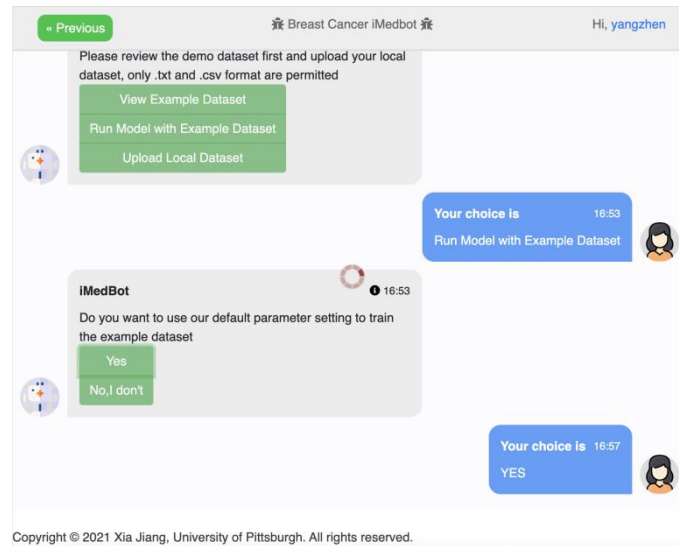


Fig. 34

b) Use user-defined parameter setting.

You can input the parameters by yourself. There will also be explanations for the name of parameters when hovering around.

Click submit and wait for the training process.

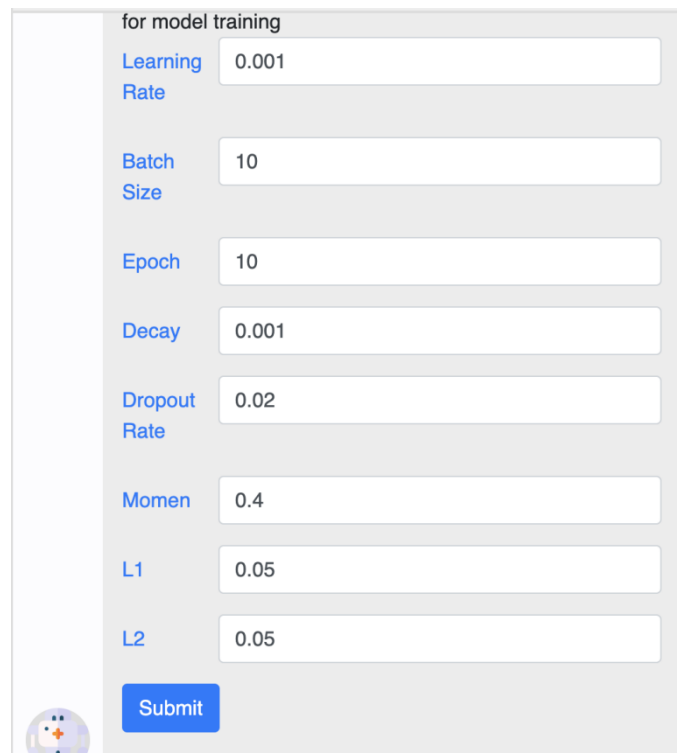
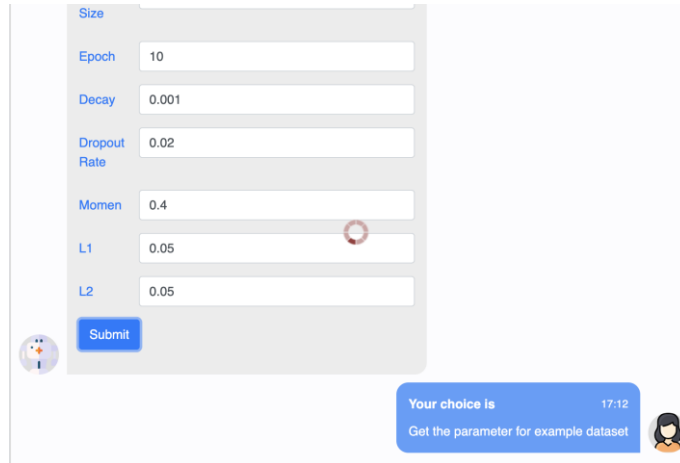


Fig. 35



Size

Epoch 10

Decay 0.001

Dropout Rate 0.02

Momen 0.4

L1 0.05

L2 0.05

Submit

Your choice is 17:12  
Get the parameter for example dataset

Fig. 36

c) See the training result.

It will show the validation AUC value and validation ROC\_curve plot.  
And explanation of AUC\_ROC will be provided if you are not familiar with it.

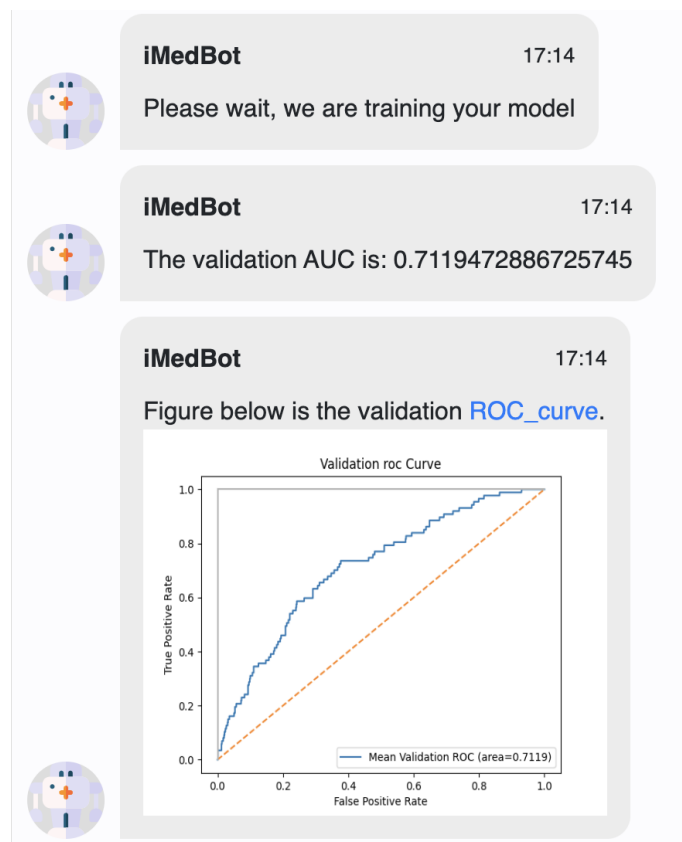
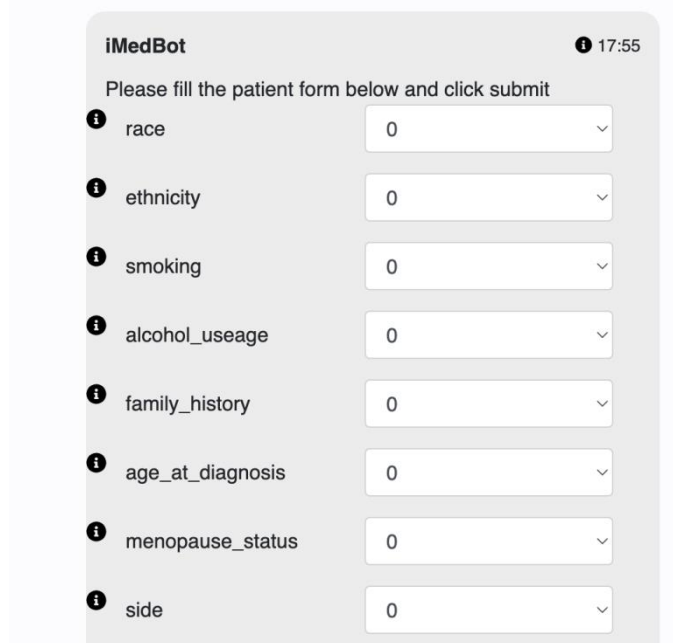


Fig. 37



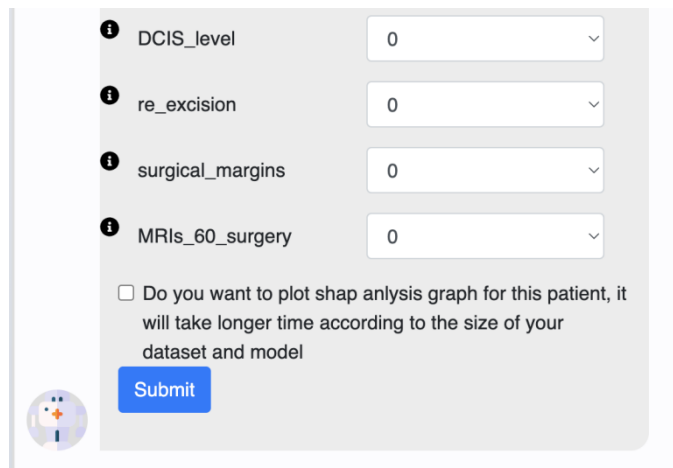
#### 4.4 Test with new patients

- 23) To test a new patient, you need to fill out the patient form and select whether to plot shap analysis.



The image shows a web interface for iMedBot. At the top, it says "iMedBot" and "17:55". Below that, it says "Please fill the patient form below and click submit". There are eight dropdown menus, each with an information icon (i) to its left. The labels for the dropdowns are: race, ethnicity, smoking, alcohol\_useage, family\_history, age\_at\_diagnosis, menopause\_status, and side. Each dropdown menu currently shows the value "0".

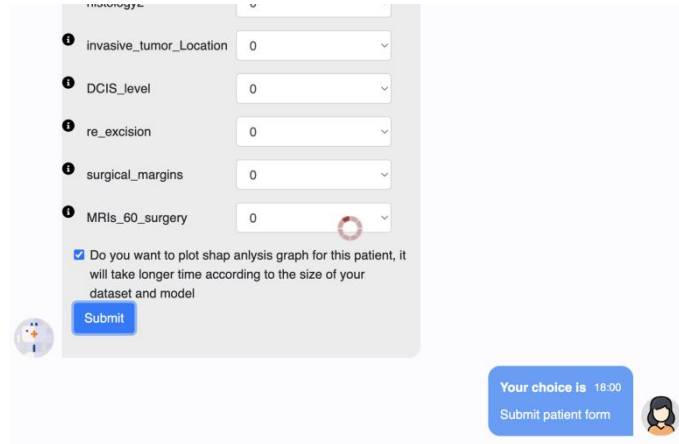
Fig. 38



The image shows the continuation of the iMedBot patient form. There are four more dropdown menus, each with an information icon (i) to its left. The labels for the dropdowns are: DCIS\_level, re\_excision, surgical\_margins, and MRIs\_60\_surgery. Each dropdown menu currently shows the value "0". Below these dropdowns, there is a checkbox with the text "Do you want to plot shap anlysis graph for this patient, it will take longer time according to the size of your dataset and model". At the bottom left, there is a small circular icon of a robot head. At the bottom center, there is a blue button labeled "Submit".

Fig. 39

- 24) Click submit and wait for the result. (If you choose to plot shap, it may take up to 2 minutes to generate. )



invasive\_tumor\_Location 0

DCIS\_level 0

re\_excision 0

surgical\_margins 0

MRIs\_60\_surgery 0

☒ Do you want to plot shap anlysis graph for this patient, it will take longer time according to the size of your dataset and model

Submit

Your choice is 18.00

Submit patient form

Fig. 40

25) See the result.

You will see the chance of target feature and shap plot (only if you choose shap).

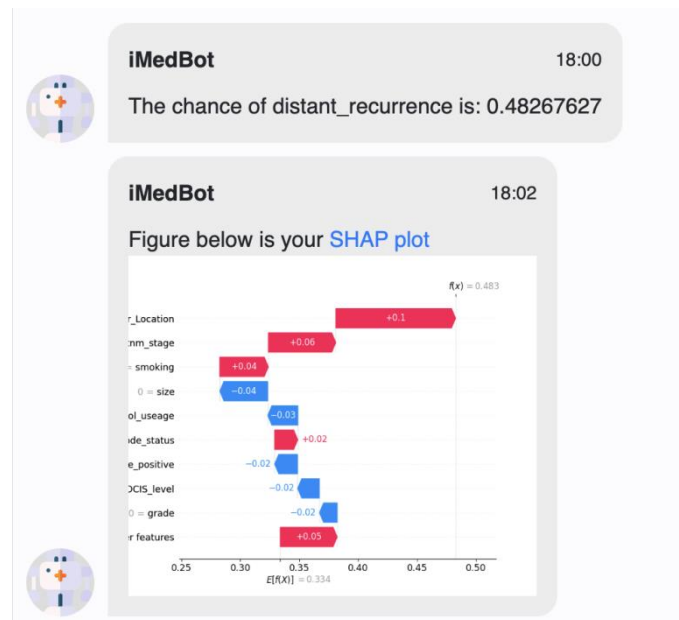


Fig. 41

#### 4.5 Retrain the model.

If you choose to retrain the model, you need to input the parameter again and the other process is the same as training with example dataset or local dataset.

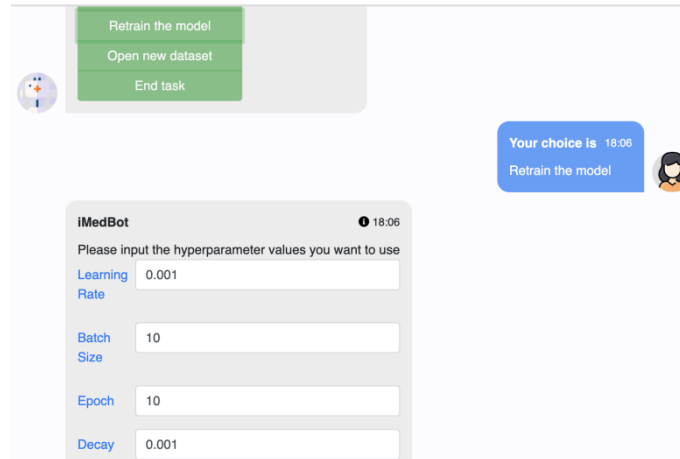


Fig. 42

#### 4.6 Open new dataset

The process is the same with section 4.3 upload local dataset.

#### 4.7 End task

You will need to choose whether to take a survey. If you choose yes, please refer to the survey system. If you choose no, the website will refresh and go to the initial state.

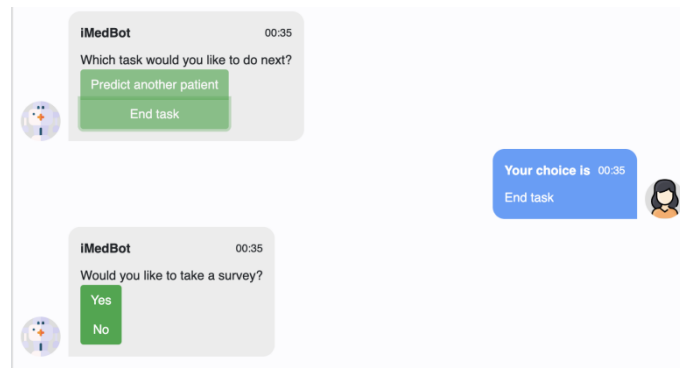


Fig. 43

## 5 Survey system

If you choose to take a survey, you need to rate the service and leave the suggestions.

You can also keep it blank, but we still hope to get valuable feedback from you!

**iMedBot** 00:43

It is my pleasure to help you. Please rate our service, thank you!

☆☆☆☆☆

Please leave your suggestions for iMedBot




Fig. 44

**iMedBot** 00:43

It is my pleasure to help you. Please rate our service, thank you!

☆☆☆☆☆

Please leave your suggestions for iMedBot




Fig. 45