Application Manual of Chest Pneumonia Detection App

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Welcome to App **Chest Pneumonia Detection**, a SMART-on-FHIR app designed to help you, the clinician, to gain an overview of a patient's basic health profile and make prediction on the presence of pneumonia based on patient chest x-ray images. This manual shows you the simple process of how to use it.

1. Launch the app

- Click the following URL to open it in a web browse such as chrome. The SMART App Launcher will open, as shown in **Figure 1**.

https://launch.smarthealthit.org/?auth_error=&fhir_version_1=r4&fhir_version_2=r4&iss=&launch_ehr=1&launch_url=https%3A%2F%2Fgithub.gatech.edu%2Fpages%2Fpracticum%2Fpracticum%2Flaunch.html&patient=&prov_skip_auth=1&provider=&pt_skip_auth=1&public_key=&sb=&sde=&sim_ehr=0&token_lifetime=15&user_pt=

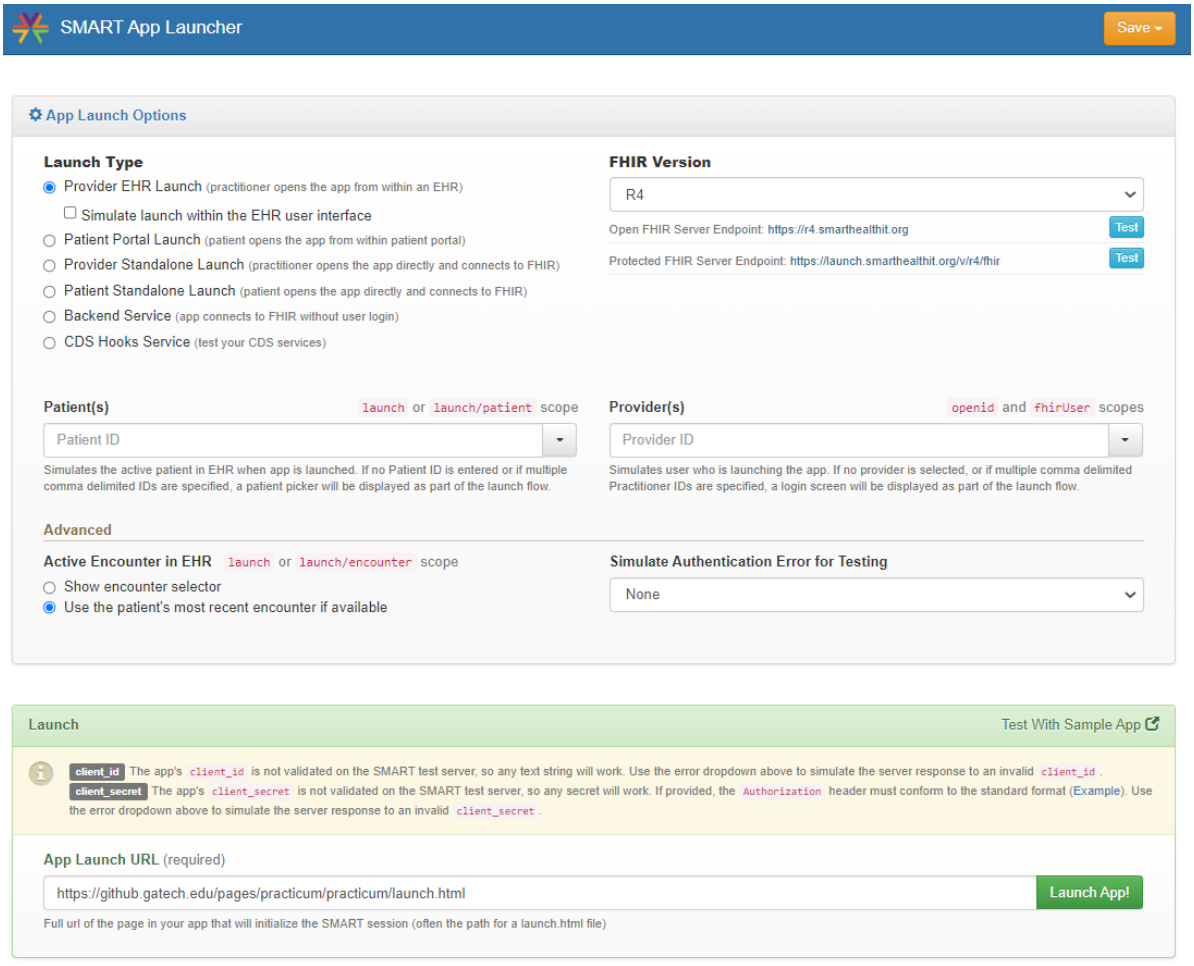

Figure 1. App launcher .

- Select the correct configurations (**Launch Type** = "Provider EHR launch"; **FHIR Version** = "R4"; **App Launch URL** = "https://github.gatech.edu/pages/practicum/practicum/launch.html") as shown in Figure 1 and then click on **Launch App!** button.
- Log in with your EHR credentials and select a patient from your patient list. For demonstration purpose of this manual, Ms. Mariana Acuna under Dr. Albertine Orn was selected.

2. View basic patient health profile

Upon selecting a patient (Ms. Mariana Acuna), the app will be displayed as shown in **Figure 2**.

- The top of the app displays demographic info of the selected patient, including name, gender and date of birth (DOB).
- Following the banner, the app displays the **latest** observations of some vital signs, including height, weight, blood pressures, LDL and HDL.
- Following that section, a **Medication Request** section on the left displays the list of medication requests the patient has. On the right is the **Chest Pneumonia Detection** module that will be introduced in detail in **Section 3** of this manual.

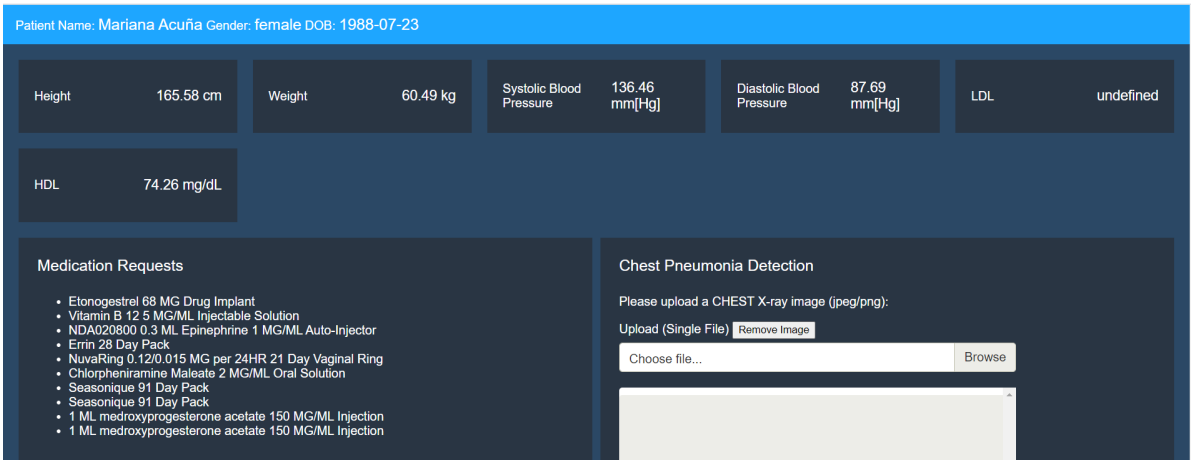

Figure 2. App displaying the basic health profile of the patient.

3. Detect possible chest pneumonia

The **Chest Pneumonia Detection** module (**Figure 3**) allows the user to detect whether the patient has pneumonia or not based on their chest x-ray image(s), utilizing a pre-trained machine learning model.

- Click "Browse" button. From the pop up window, navigate your local device to choose a chest x-ray image and click "Open". **Note currently only .jpeg or .png format is acceptable.** An example is shown in **Figure 4**.
- A preview of the selected image will be displayed on the app, as shown in **Figure 5**. When the selected file is not .jpeg or .png, an alert message will show up that prompts corrections, as shown in **Figure 6**.
- Click "Submit" button under the image preview. A prediction message will be displayed under the "Prediction Results" title: "Normal" indicates the patient is healthy, and "Pneumonia" indicates the patient has pneumonia based on the model.
- Currently, the app is designed for taking single image file for the prediction. If there are two or more x-ray images that the user would like the app to analyze, first click "Remove Image"

button and then refresh the page (for chrome, the "reload" button is located on the upper left corner before repeating the aforementioned steps.

- The user can choose to add an annotation to the image or prediction. If so, the app displays the latest annotation under "Latest Annotation", including the author (Test Author) and time when the annotation is made. An example is shown in **Figure 7**.

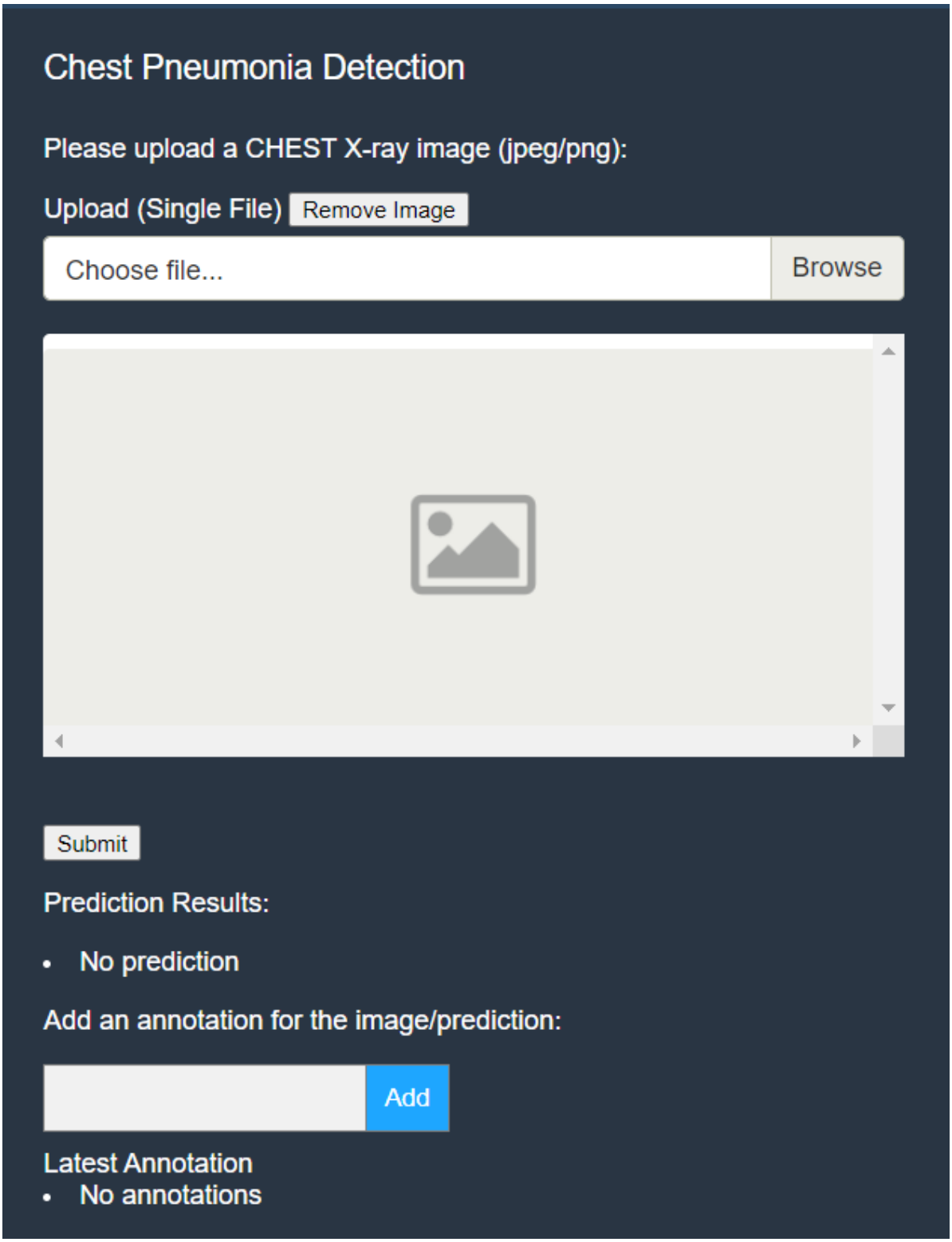

Figure 3. View of the "Chest Pneumonia Detection" module.

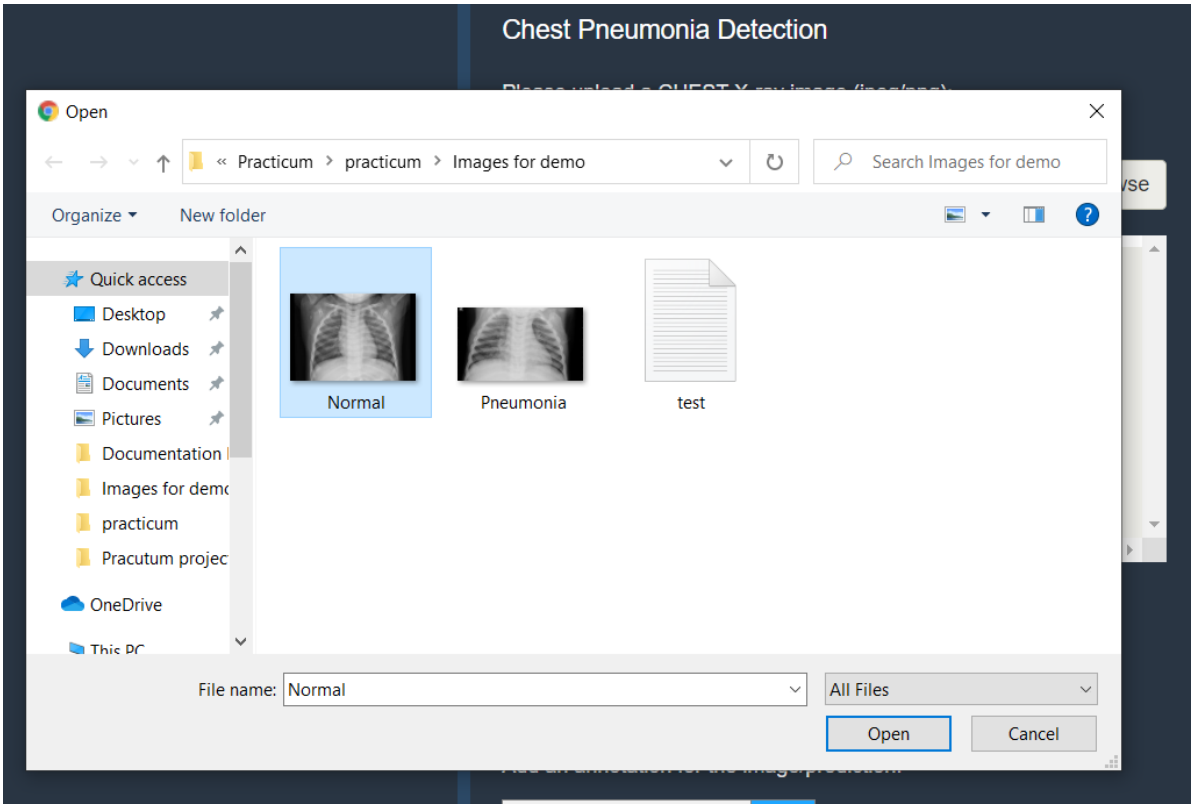

Figure 4. Selecting a local chest x-ray image.

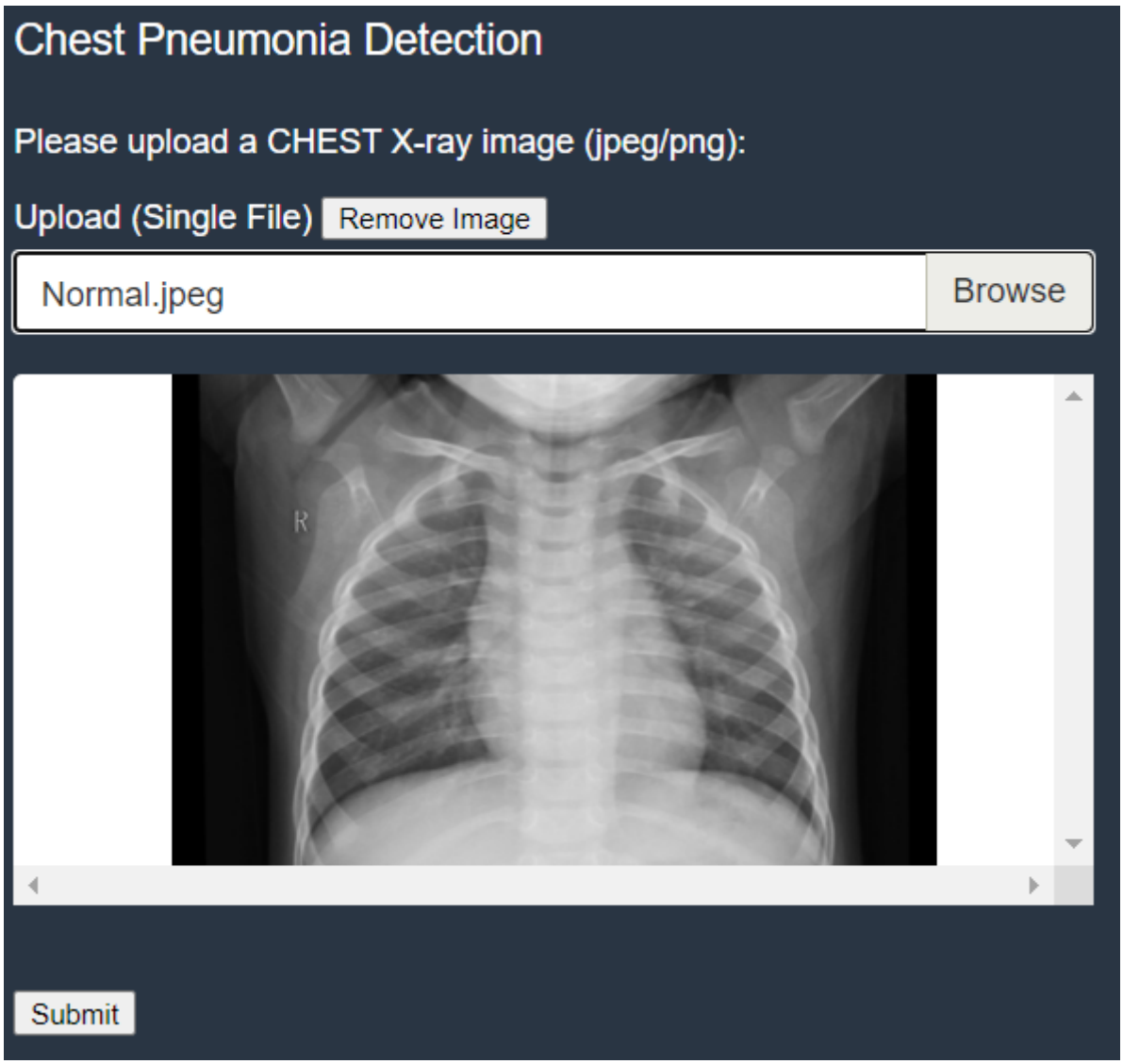

Figure 5. Preview of the selected x-ray image.

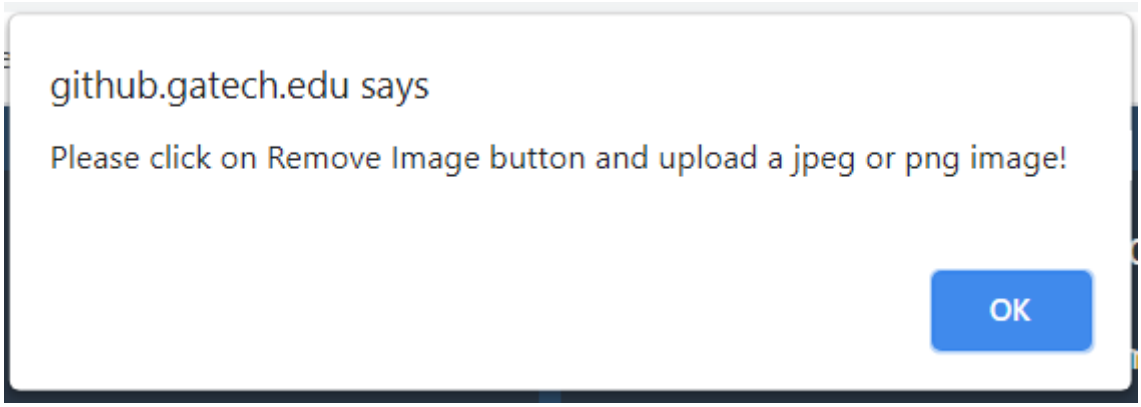

Figure 6. Alert massage when a file with incompatible format is selected.

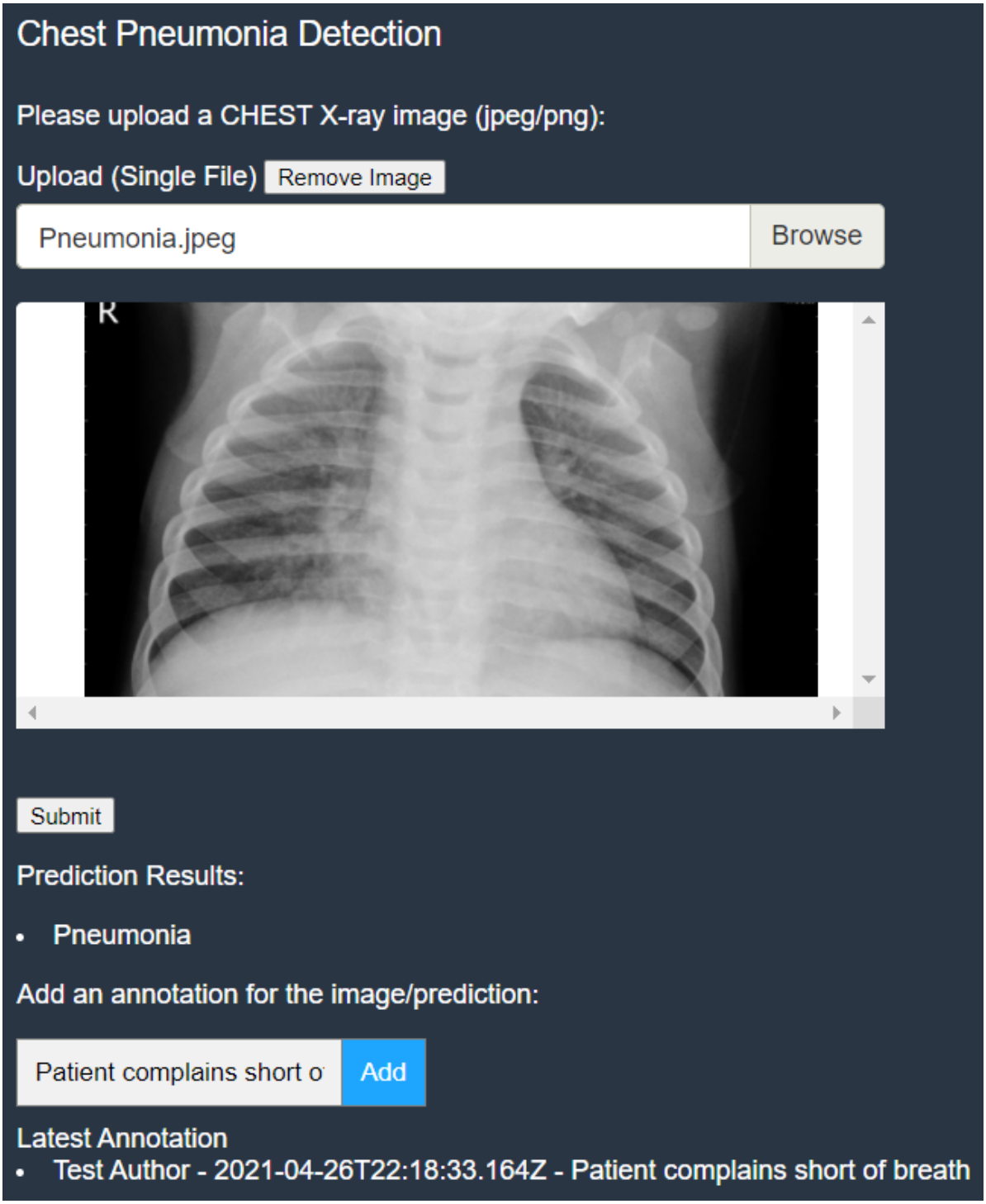

Figure 7. An example of positive prediction and annotating the image.