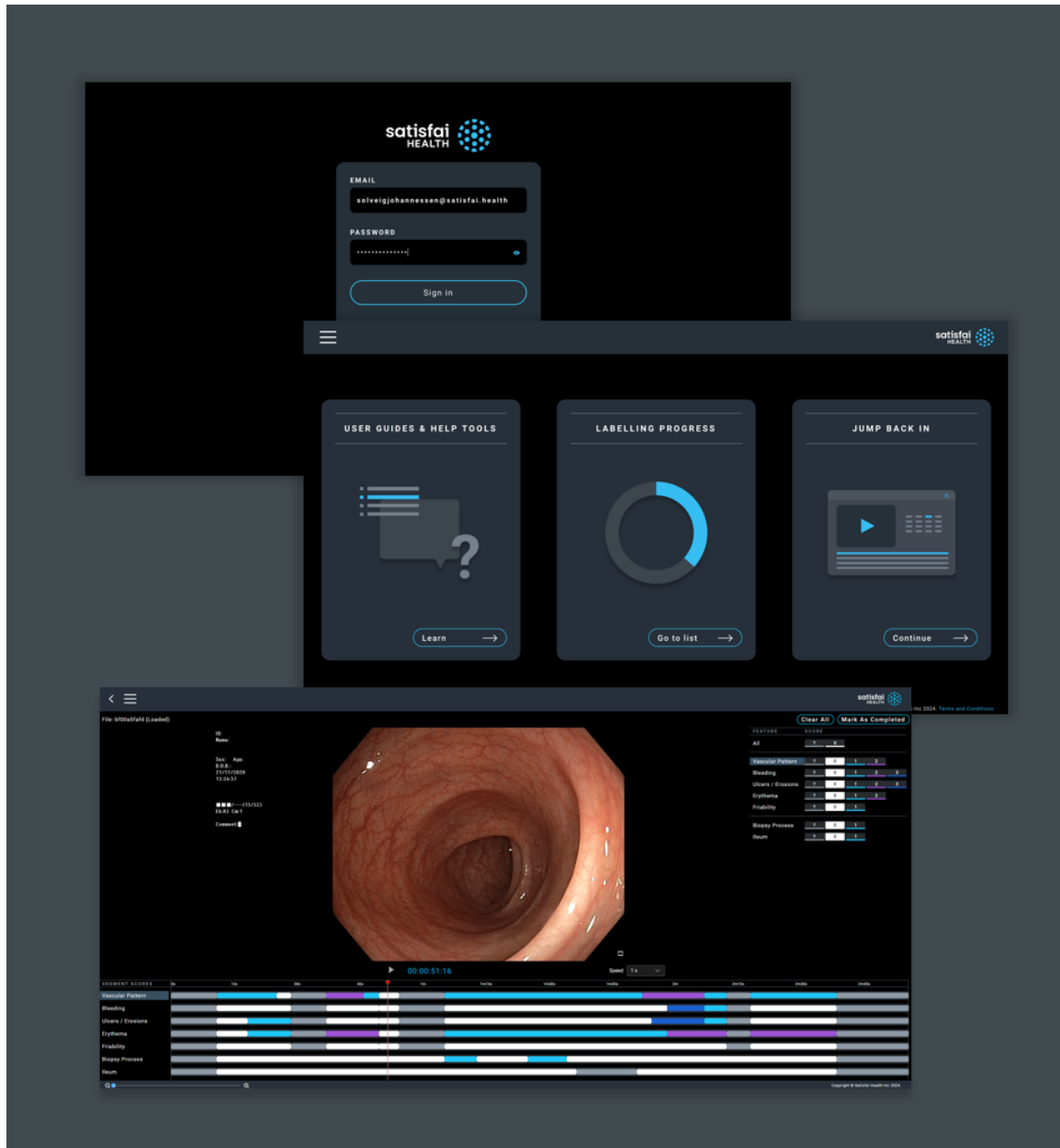


Satisfai Image Annotator (SIA)

User Manual



1. PURPOSE

The purpose of this document is to provide Quick Start Guide to labellers on how to use the Satisfai Image Annotator (SIA).

2. SCOPE

This document describes how to use SIA, a web-based tool developed by Satisfai Health for annotating endoscopy videos focusing on the sub-components of disease activity of IBD UC patients. (labelling videos). The goal is to gather annotations to train AI algorithms for automating UC IBD sub-scoring.

Out of scope: local and central reader scoring.

3. REFERENCES

EXT003

Satisfai SIA Training presentation

4. DEFINITIONS AND ABBREVIATIONS

Category	#	Descriptor	Definition
Erythema	-	Undefined	Status is indeterminate
	0	Normal	Normal pink colour, smooth, glistening mucosa
	1	Erythema	Increase in colour of mucosa, mucosa looks light red
	2	Marked erythema	Marked increase in colour of mucosa, mucosa looks dark red
Vascular Pattern	-	Undefined	Status is indeterminate
	0	Normal	Branching blood vessels (arborization of mucosal vessels) are clearly defined and visible through the mucosa
	1	Decreased/Patchy obliteration	Decreased vascular pattern or patchy loss of capillary margins
	2	Absent/Obliterated	Absent vascular pattern or complete loss of capillary margins
Bleeding	-	Undefined	Status is indeterminate
	0	None	No blood present

Category	#	Descriptor	Definition
	1	Mucosal	Some spots or streaks of coagulated blood on the surface of the mucosa ahead of the scope that can be washed away
	2	Luminal mild	Some free liquid blood in the lumen
	3	Luminal moderate or severe (Spontaneous)	Frank blood in the lumen ahead of the endoscope or visibly oozing from the mucosa after washing intraluminal blood, or visibly oozing from a haemorrhagic mucosa
Ulcers and Erosions	-	Undefined	Status is indeterminate
	0	None	No Erosions present
	1	Erosions	A tiny (≤ 5 mm) ulcerative defect of the mucosa of white or yellow colour with flat edges
	2	Superficial ulcer	Superficial ulcerations appear as larger (> 5 mm) defects of the mucosa, which are discrete fibrin-covered ulcers in comparison with erosions.
	3	Deep ulcer	Deep ulcers can appear as deeper, excavated defects of the mucosa with slightly raised edges.
Friability	-	Undefined	Status is indeterminate
	0	Absent	No Observed Friability
	1	Present	Bleeding associated with the passage of the endoscope or light touch. Score friability on withdrawal to differentiate from spontaneous bleeding.
Biopsy Process	-	Undefined	Status is indeterminate
	0	No	No biopsy tool observable.
	1	Yes	Biopsy tool in frame and/or biopsy related bleeding is observed.
Ileum	-	Undefined	Status is indeterminate
	0	Out of Ileum	Endoscope is outside of the ileum
	1	In Ileum	Endoscope is within the ileum

5. SYSTEM REQUIREMENTS

5.1. Compatible Browsers

SIA is compatible with the latest version of the following browsers:

- Google Chrome (versions 91 and above)

Other browsers may work; however, we can't guarantee optimal user experience. Some browsers may require additional configuration for optimal use.

Unsupported Browser:

- Internet Explorer: Please note that Internet Explorer is not supported for the use of SIA software.

Mobile Device Usage:

While SIA software can be accessed on mobile devices, it is essential to understand that the mobile interface is not the primary intended use. Some functionalities available in SIA may not be accessible or fully functional on mobile devices.

5.2. Minimum Screen Resolution

1280 x 1024 is our lowest recommended screen resolution.

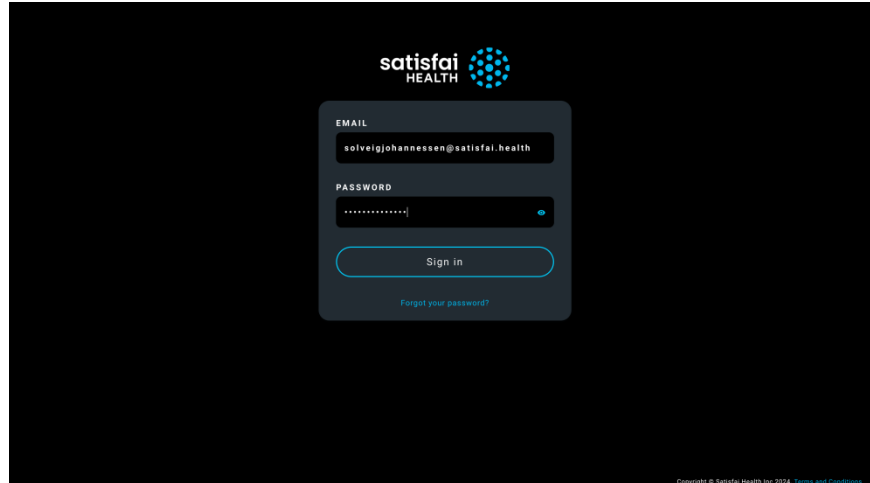
For the best viewing experience, we suggest maintaining the browser zoom at 100%, as zooming beyond this range can lead to issues such as pixilation, horizontal scrolling, layout overlaps, content cut-off, and disproportionate sizing. However, the browser zoom can be adjusted based on personal preferences.

6. SIA FEATURES

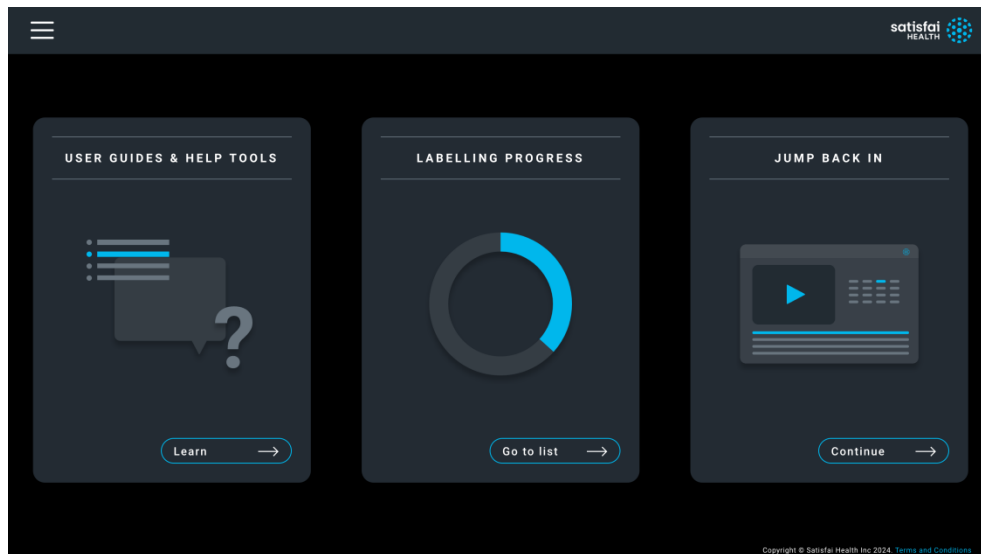
6.1. Login and video selection

The first step is to log in to the labeling tool software or SIA. Access to SIA will be emailed to you from Dova Health Intelligence engineering@dovahealth.ca Check your spam/junk mail folder.

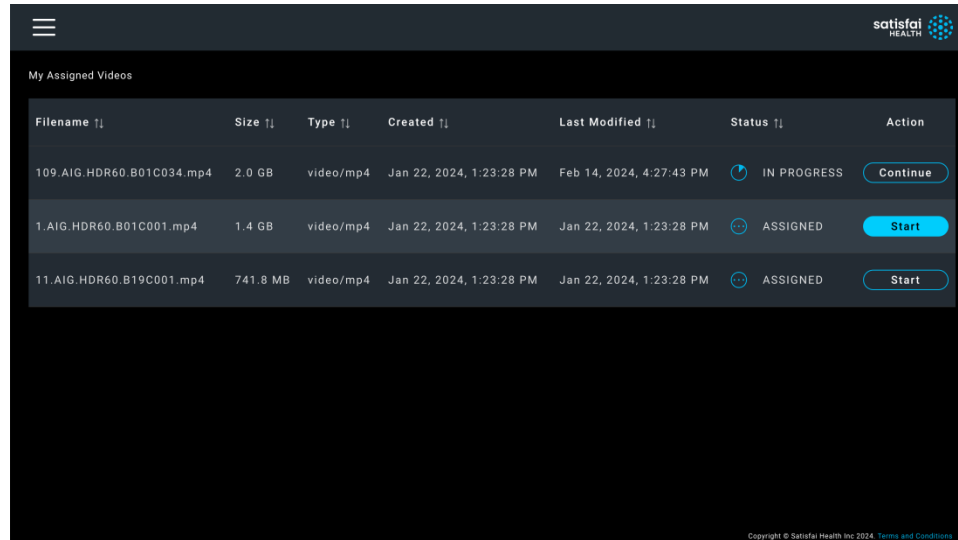
1. After opening the software, enter your username (email) and password and click Sign in.



2. You are now on the homepage! Click on “Go to list” in the LABELLING PROGRESS box in the middle of the screen to access the videos.

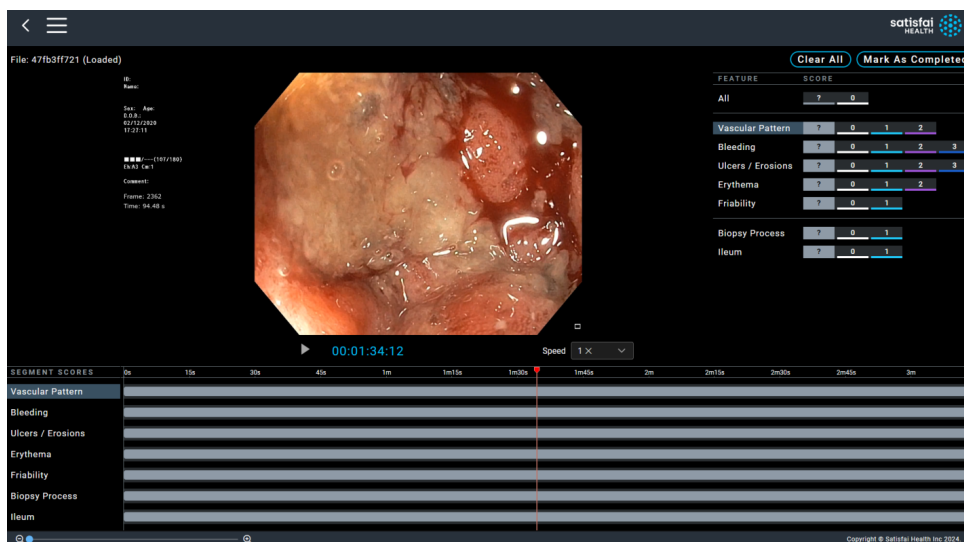


- If you have already started labelling the “JUMP BACK IN” card will display and you can continue labelling where you left off
3. This screen displays all videos assigned to you, as well as status (“ASSIGNED”, “IN PROGRESS” or “COMPLETED”).
 - To open a video for labeling, click “Start”, or “Continue”

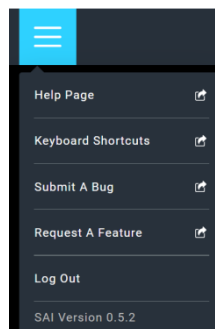


6.2. Labeling tool layout

- Once a video has been selected for labeling, the following screen appears:



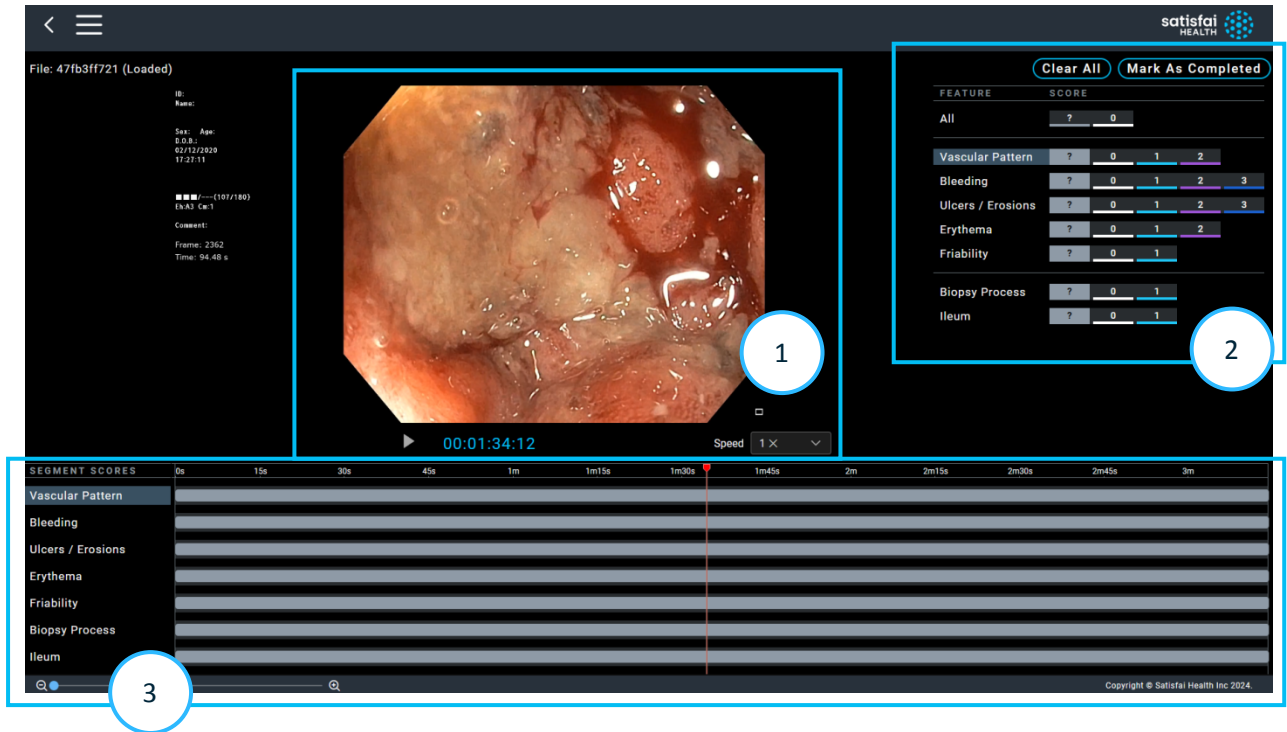
- This menu on the top left side of the screen provides access to Software Version, Log Out page, and various forms of help and settings.



6.3. Labeling Interface

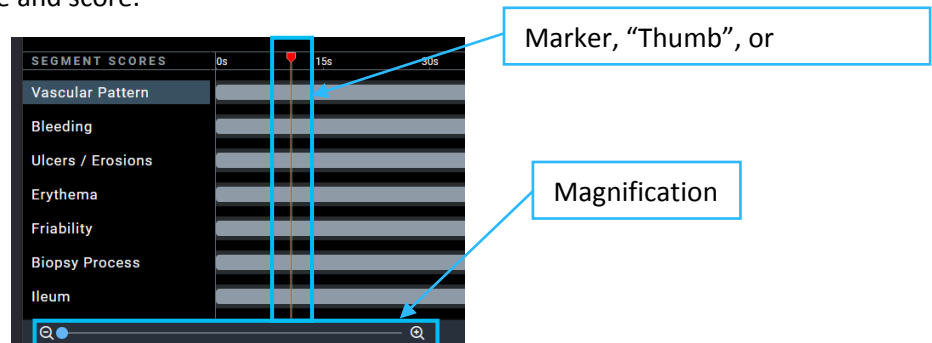
The labeling interface is divided into three sections:

- Section 1: Endoscopy video
- Section 2: Feature selection and score assignment
- Section 3: Video timeline and visual representation of features and scores

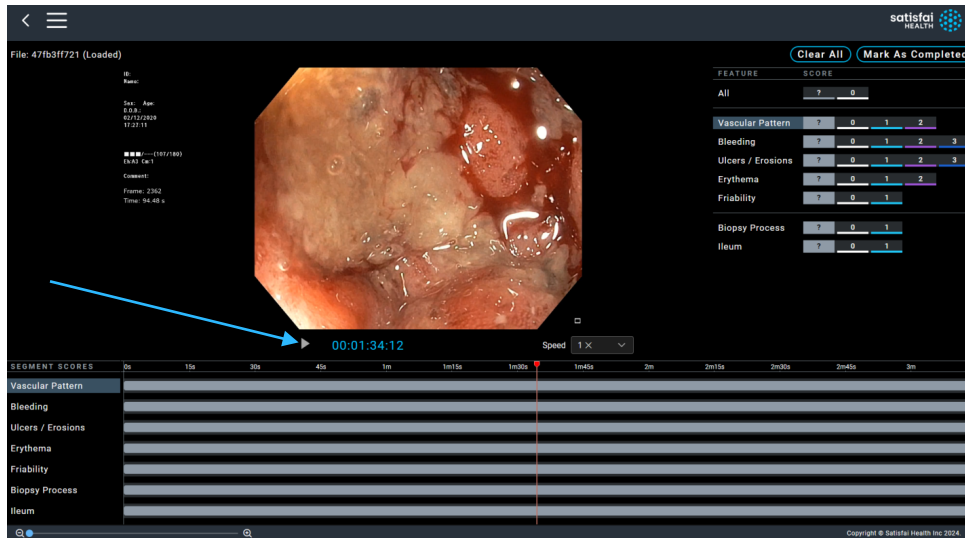


The red vertical line in Section 3 is the time marker, “thumb”, or “playhead”.

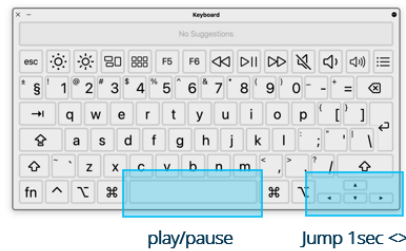
Section 3 also includes a slider which magnifies the timeline to allow for more accurate delineation of start and end time of the Feature and score.



Click on the play button and the video will start to play.



Or use the spacebar key to play. Additional keyboard shortcuts can be found in section 7.5.



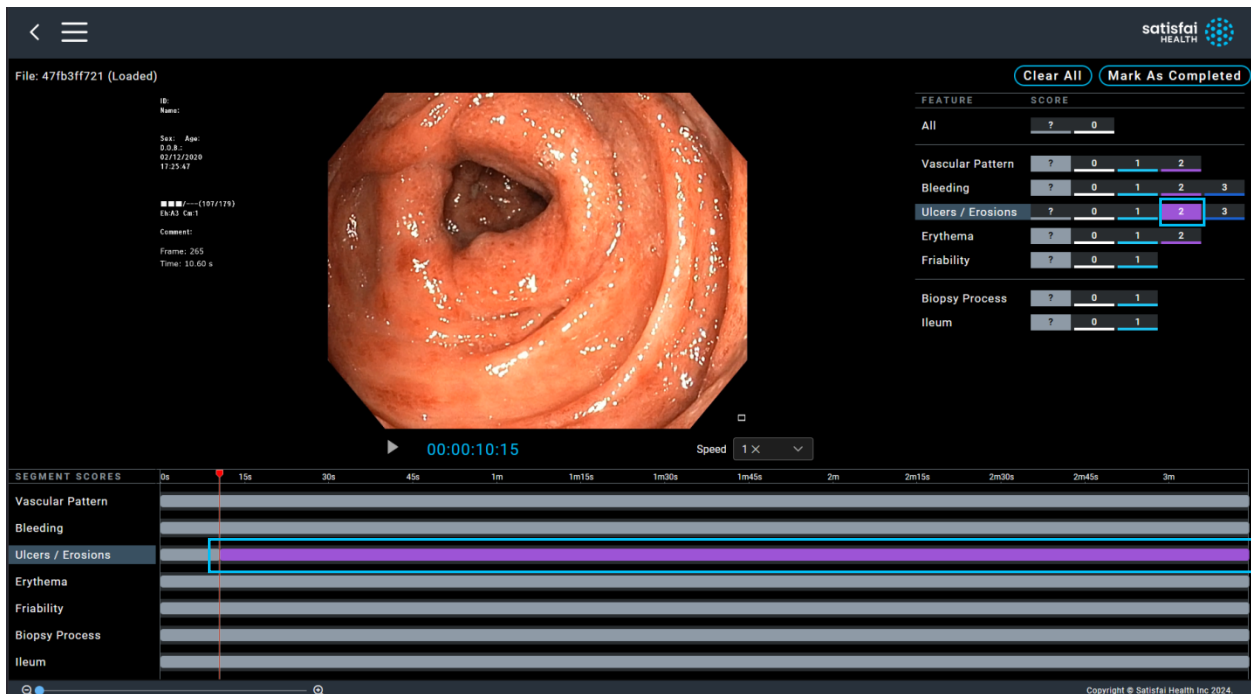
6.4. Feature selection and scoring

Use the mouse or up (↑) and down (↓) arrow keys on your keyboard to select the feature for scoring. For example, press the down (↓) arrow key until the “Ulcers/Erosions” category is highlighted in both the Features and scoring section as well as Timeline section. Then select the number you wish to assign. For example, to score Superficial ulcer press “2”, or click with the mouse.

When a feature is selected, it will be highlighted in gray in the feature selection and timeline.



The colour assigned with the feature will be reflected in the timeline at the bottom of the screen.



It is important to note that the score for a selected feature is started and ended in relation to the “Thumb” (or “Playhead”) in the timeline section. SIA will assign the score from the time marker to the end of the video or to the next score assigned to that feature.

You can set all Features from the position of the time marker to “Undefined” (“-” or dash) or “None” or “Normal” (“0” or zero) by using the “All” Feature.

The screenshot displays the Satisfai Health software interface. At the top left, there is a navigation menu with a back arrow and a hamburger menu icon. The top right corner features the Satisfai Health logo. Below the navigation, the file name 'File: 47fb3ff721 (Loaded)' is shown. The main area is dominated by a large endoscopic video player showing a close-up of the colon mucosa. To the right of the video player is a 'FEATURE SCORING' panel. This panel has a 'Clean All' button (indicated by a red arrow) and a 'Mark As Completed' button. Below these buttons is a table for scoring features. The 'All' feature is currently set to '?' and '0'. Other features include 'Vascular Pattern', 'Bleeding', 'Ulcers / Erosions', 'Erythema', 'Friability', 'Biopsy Process', and 'Ileum'. Each feature has a dropdown menu for the score (0, 1, 2, 3) and a progress bar. At the bottom of the interface is a 'SEGMENT SCORES' timeline from 0s to 3m, with a play button and a speed control set to 1x.

FEATURE	SCORE
All	? 0
Vascular Pattern	? 0 1 2
Bleeding	? 0 1 2 3
Ulcers / Erosions	? 0 1 2 3
Erythema	? 0 1 2
Friability	? 0 1
Biopsy Process	? 0 1
Ileum	? 0 1

Note: the “All” feature won’t apply labels to “Biopsy Process” or “Ileum”.

6.5. Biopsy process

Use the mouse or up (↑) and down (↓) arrow keys on your keyboard to select “Biopsy Process”.

- Select “1” at the start of where a biopsy tool enters into view.
- Select “0” at the end of biopsy related bleeding.

6.6. Ileum

Use the mouse or up (↑) and down (↓) arrow keys on your keyboard to select “Ileum”.

- Select “1” at the start of where the endoscope enters the Ileum.
- Select “0” at the when the endoscope leaves the Ileum.

Note: while the endoscope is in the ileum, no other scoring should be recorded.

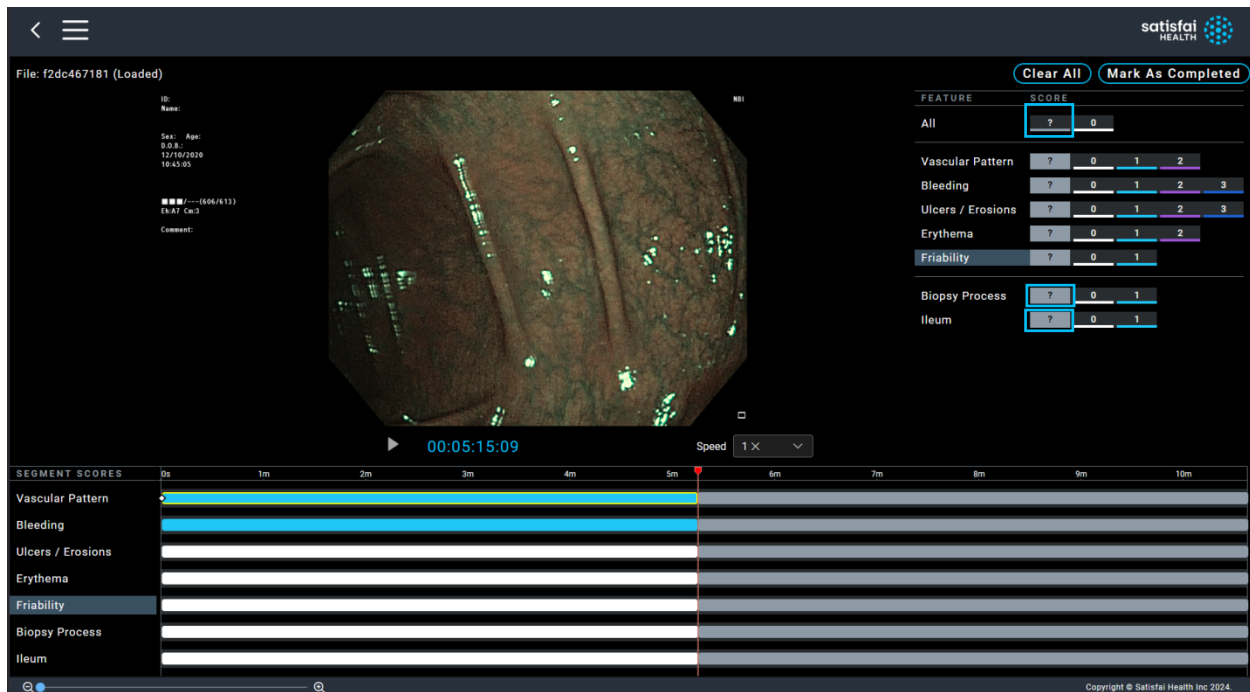
6.7. Undefined

If you cannot define an individual feature because the image is blurry, blacked out, etc, you can choose “?” by pressing ‘-’ on the keyboard when that feature is highlighted. This tells the AI Model to ignore that feature for that section in the video during training.

If you cannot define any features because the image is blurry, blacked out, etc., you can choose the “All” “?”. This will mark all features as undefined simultaneously.

6.8. Chromoendoscopy

All features in the video should be marked as “?” when chromoendoscopy is observed.

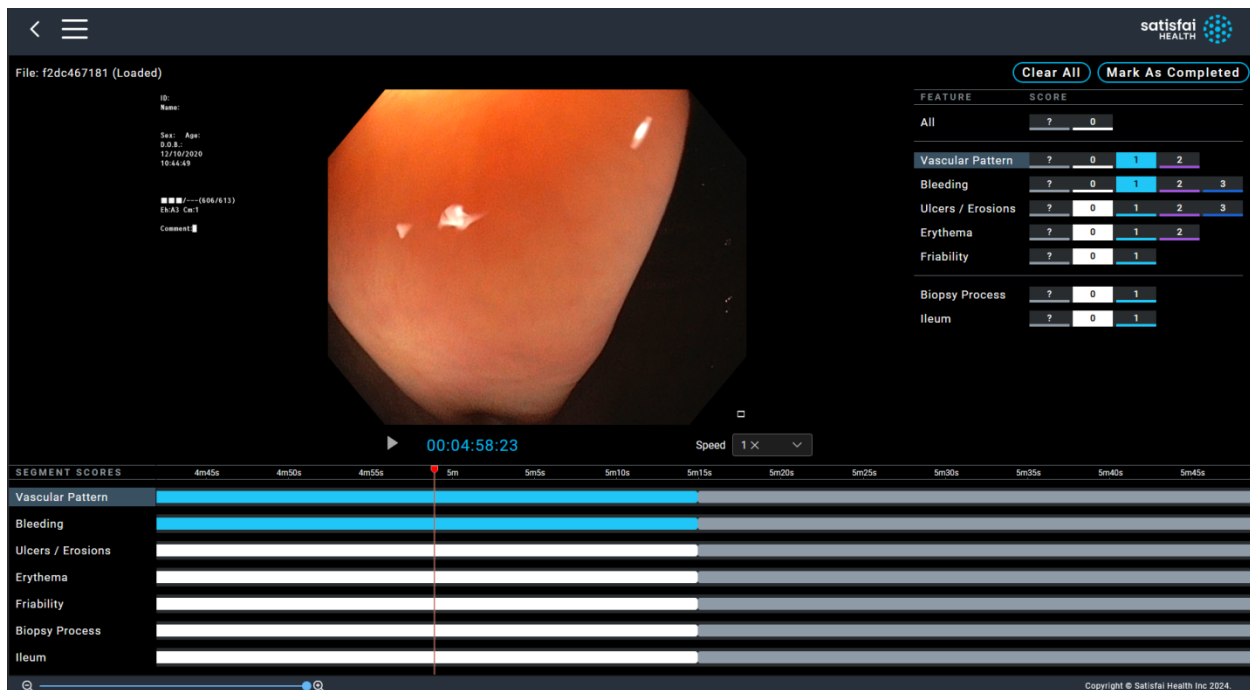


6.9. Changing a score for a Feature

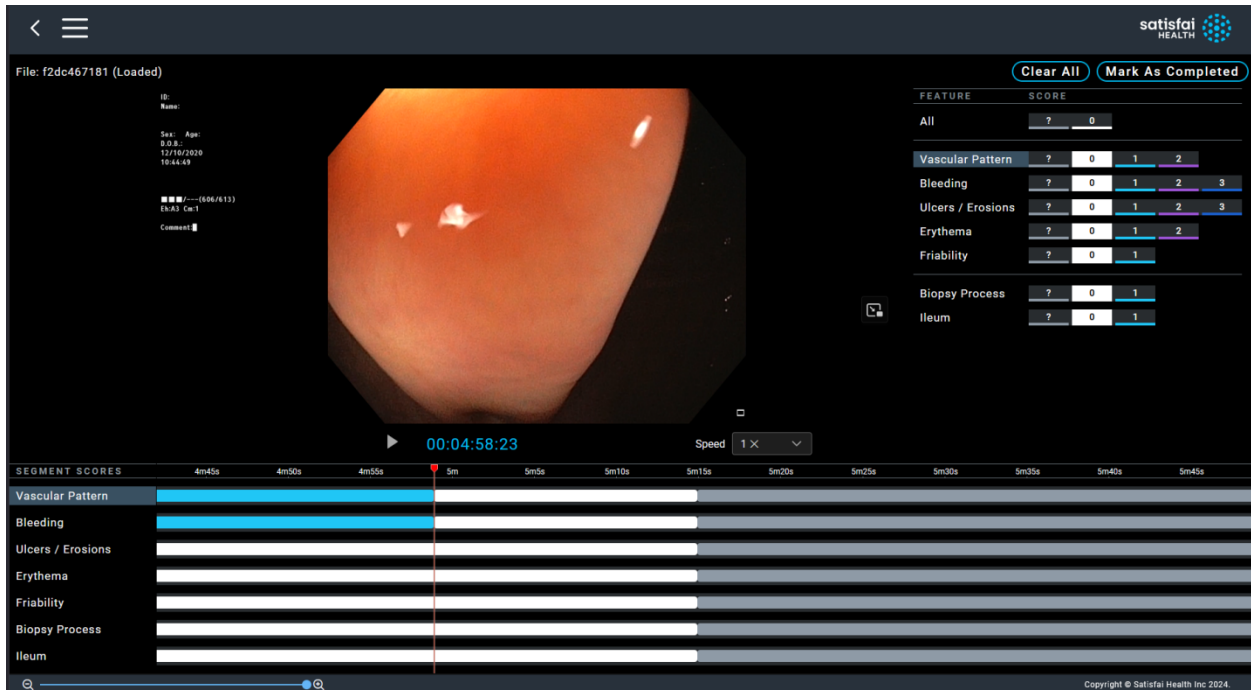
The score for a Feature is changed or modified in relation to the time marker.

Move the time marker to the beginning of the section (Feature and score) to be updated (sliding the magnifier all the way to the right is recommended).

Before:



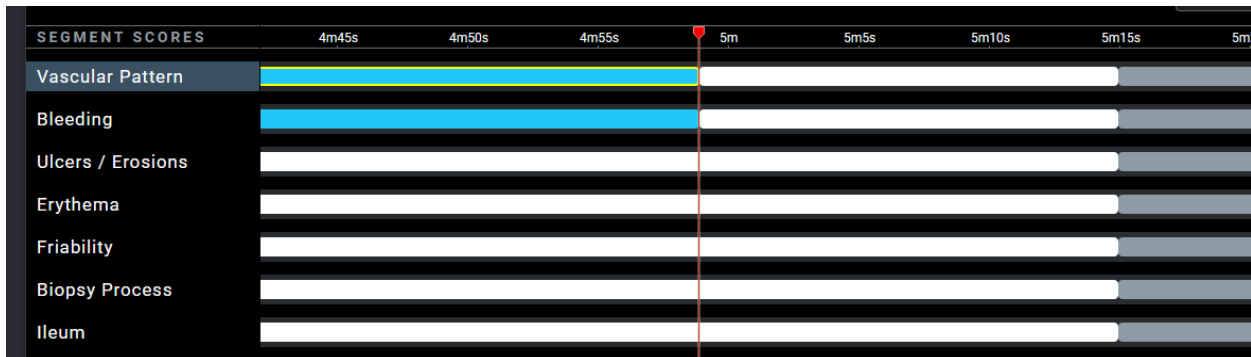
After:



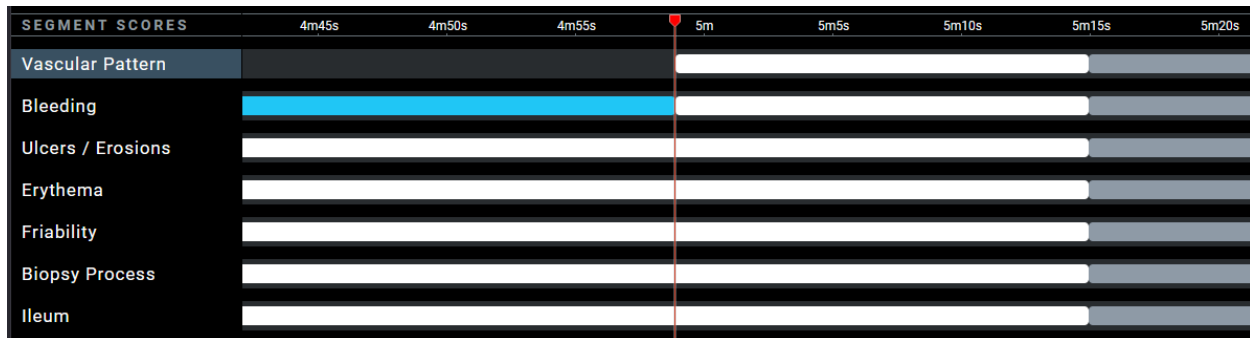
6.10. Deleting a score for a Feature

To delete a score for a feature, use the mouse to select the bar associated with that feature on the features and scores section and press “Delete”.

Before:



After:



Note: this will leave the track “blank” where the score was deleted. You will need to add an appropriate score in that section.

7. LABELING PROCESS

7.1. Starting a New Video

Initially, the entire video is marked “?” for all features. Begin by marking the start of the first visible state for each feature at the 00:00 timestamp.

If the start of the video is an out-of-body segment, then you should wait until an in-body segment before transitioning from “?” to a new state for each feature. Please add a comment when a scope out of body has been viewed.

7.2. Continuing the Video

As the video progresses, update scores to reflect visible changes, creating new intervals on the timeline. Once again, marking a new score for a feature creates an end timestamp for the previous state and a start timestamp for the new state on the timeline. Keep a close eye on the red timestamp marker in the visual timeline as this is always the point at which you are applying a score transition.

Mistakes in transition points can be corrected easily using the red timestamp marker to adjust start/end points. You can also use arrow keys to jump a few seconds to the right or left if the interval needs to be adjusted slightly.

All labeling progress for a started video is automatically saved, so there is no need to manually save your progress and if you are not able to complete labeling a video in one sitting, you can always return to the same video to continue with labeling. When you sign back into SIA and check your assigned videos, you can see the status for the video will have changed from “Assigned” to “In-Progress”. Click on “Continue” to return to the video and continue labeling.

7.3. Resetting Progress on Video

If you feel the need to completely “reset” a video for whatever reason, you can click on the “Clear all” button on the top right of the screen to reset all labels for the video.

If you accidentally clicked this button, don’t worry as you will also need to “Confirm” the reset. The clear all action can be undone using “CTRL-Z”.

7.4. Completing the Finished Video

Once you have completed annotating a video such that all intervals for all features are marked for a video from start to finish (including insertion & withdrawal), you can click on the “Mark as Completed” button at the top right of the screen.

A pop-up will appear requesting additional information:

Global MES Score: please provide the video’s MES (based on the most inflamed segment of the colon).

Insertion Phase Absent: check if the insertion phase was not part of the video.

Withdrawal Phase Absent: check if the withdrawal phase was not part of the video.

Suspected Chron’s: check if any part of the video is suspected of Chron’s disease.

Personally Identifiable Information (PII) Present: check if any part of the video leads you to believe that PII is being displayed (e.g. sections of the video outside of the patient and viewing patient documents or the patient’s face).

Time to Label: indicate the time it took you to label in minutes.

Comments: include any additional comments about video observations. If applicable, include details of when and what PII was observed.

7.5. SIA Keyboard Shortcuts

Keyboard Key(s)	Action
Spacebar	<i>Plays/pauses video</i>

Left and Right Arrow	<i>Moves thumb/video by 1 (one) second</i>
Shift plus Left Arrow or Shift plus Right Arrow	<i>Moves thumb/video by 5 (five) seconds</i>
Alt plus Left Arrow or Alt plus Right Arrow	<i>Moves thumb/video by 1 (one) frame</i>
Up Arrow and Down Arrow	<i>Moves between features (sub-scores)</i>
Delete/Backspace	<i>Removes highlighted keyframe (diamond), thereby cancelling block to next keyframe</i>
S (Snap)	<i>Moves all highlighted keyframes (diamonds) to current thumb location</i>
Shift plus -	<i>All Undefined</i>
Shift plus 0	<i>All Normal</i>

8. TROUBLESHOOTING

In case you get lost, the URL for the “Labelling Progress” section is <https://sia.dovahealth.tools/labelling>

8.1. General:

Q: How do I get to SIA?

A: You can log in at this link: <https://sia.dovahealth.tools>

Q: What are my login credentials?

A: Your login credentials will have been sent to you by email. Your username is your email address. You will also receive a temporary password that you will change when you first log in.

Q: How do I find my login credentials?

A: Your login credentials will have been sent to you by email. The email will have the sender, engineering@dovahealth.ca If you can't find them in your inbox, check your spam folder. Otherwise, please contact us at the same email for help.

Q: What are the password requirements?

A: First, it is good practice to not re-use other passwords from other sites for SIA. We recommend a password manager to make it easy to create and manage different passwords for different sites. There are many good ones out there. Feel free to contact us for recommendations. A password manager can help generate and remember random password. SIA passwords need to contain both lowercase and uppercase letters as well as numbers and symbols and must be at least 12 characters long.

Q: I have forgotten my password. What do I do?

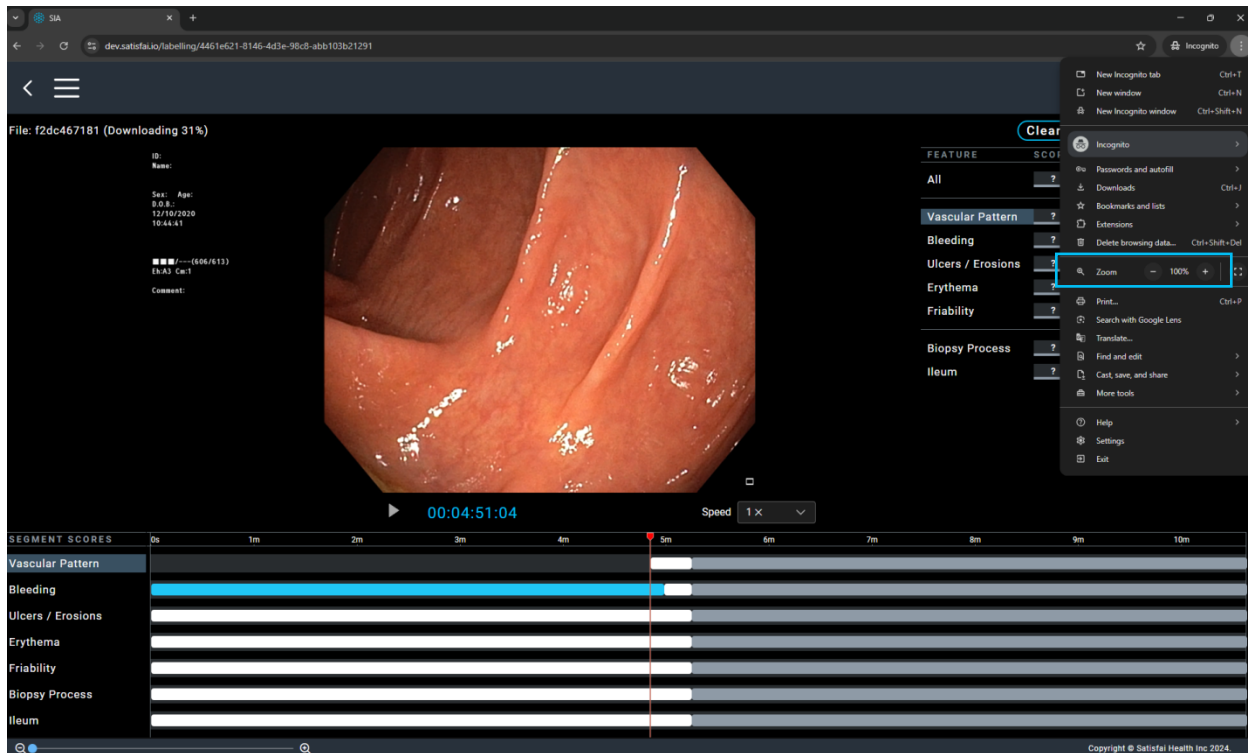
A: You can select "Forgot password" at the login screen to change your password. Your username is your email address to which your credentials were originally sent.

Q: What web browser should I use?

A: SIA is currently supported for the desktop Chrome browser (version 120 and above) on Windows, Mac, and Linux.

Q: How to I make the endoscopy video larger?

A: Adjust the zoom settings on your browser until the view suits you.



Q: The video is not scrolling smoothly through video when dragging the thumb?

A: The video has not have finished downloading into your local cache. Give the video a more time to buffer/download. Try improving your internet your internet speed connection.

Q: How do I report bugs that I encounter?

A: If you come across something that doesn't seem to work right, please leave send an issue report to engineering@dovahealth.ca. Don't be shy. The more information you can give us to reproduce any problems or inconveniences you encountered, the faster we can fix them. Please include things like the version of the app (in the menu), what went wrong, and how to reproduce the issue.

Q: How do I request new features in the app?

A: We are also keen to hear from you if you have ideas for new features that would make the app better or easier to use. Please request new features using engineering@dovahealth.ca.

Q: Where do I find the version number (for reporting bugs)?

A: The SIA version can be found at the bottom of the Main menu (three horizontal lines at top-left).

8.2. Labelling

Q: Are there keyboard shortcuts for the common actions?

A: Yes! The keyboard shortcuts have been explicitly provided to significantly increase labelling speed. The list of keyboard shortcuts for SIA can be found Main menu (three horizontal lines at top-left).

Q: Why does the colour of the remaining bar/track change when I add a label?

A: SIA's power is in its ability to mark when image features change. It does this by allowing the user to mark keyframes with the new score where the change occurs. This means that when you mark a change in a feature like Vascularity the application will insert a keyframe at that location and assume that feature score remains the same until the next change (keyframe) occurs. If there are no following changes yet marked for that feature, then the application will show the score until the end of the video.

Q: How do I delete a label/keyframe?

A: When you place a feature mark in the file, a keyframe is created. To delete that keyframe, click on the coloured bar immediately to the right of the keyframe. The keyframe will be highlighted with a yellow diamond. Hitting the delete key will remove this keyframe.

Q: I need to move a label/keyframe to more accurately match the video. How do I do that?

A: Position the video thumb (red vertical line) at the location in the video you want to reposition the label/keyframe to (zoom in for more accuracy), then select the coloured bar immediately to the right of the keyframe (zoom in for more accuracy). This will highlight the keyframe to move with a yellow diamond. Press the "s" shortcut key. This will reposition the beginning (keyframe) of all selected sections to the location of the video (red vertical line).

Q: I have marked a video "Completed". It won't let me open it again, but I want to change it. How do I do that?

A: Contact us at engineering@dovahealth.ca and we can remove the "Completed" indicator for that file.