ID#	Functionality	Scenario	Steps to be Executed	Expected Result	Pass/Fail	Comments
1	Startup / PWA Load	App loads in browser	1. Open the PWA URL in Chrome/Safari. 2. Wait for app to fully render.	Home page renders within 3 seconds; NavBar, hero text, and stroke education cards are visible.	Pass	The whole app takes less than 2 seconds to fully render, and all pages are visible
2	Startup / PWA Load	Medical disclaimer modal appears on first analyze	1. Navigate to /analyze. 2. Upload a valid CT scan. 3. Click 'Analyze File'.	The disclaimer model appears before any result is shown. User must acknowledge before proceeding.	Pass	Allows to go to the analysis page and upload a file, as well as changing the icon when the file is uploaded.
3	Navigation	Home page route loads	1. Open PWA. 2. Confirm URL is '/'.	HomePage renders with mission statement, how-it-works section, and why-it-matters section	Pass	The HomePage renders with each of the informational sections correctly loaded. The mission statement, how-it-works section, why-it-matters section, and additional buttons that lead to other pages are all visible and usable.
4	Navigation	Navigate to Analyze page	1. From Home, click 'Analyze' in NavBar.	URL changes to /analyze. AnalyzePage with upload box is displayed.	Pass	The the user can easily navigate from the Home to the Analysis page via the NavBar or various other buttons housed on the Homepage. The URL changes to /analyze.
5	Navigation	Navigate to Feedback page	1. From any page, click 'Feedback' in NavBar.	URL changes to /feedback. FeedbackPage form is fully rendered.	Pass	The feedback button is available from any page and correctly navigates to the feedback page
6	Navigation	Active route is highlighted in Navbar	1. Navigate to each of the 4 pages.	NavBar highlights the active route link on each page.	Pass	The NavBar is accessible from any of the pages, allowing for easy movement. The page the user is on is highlighted on the NavBar.
7	Navigation	Back button works correctly	1. Navigate Home → Analyze → Feedback. 2. Press browser back button.	Browser back navigates to previous route correctly; no blank page or error.	Pass	The browser back button correctly navigates the user through their previous route backwards.
8	CT Scan Upload	Upload valid PNG CT scan	1. Go to /analyze. 2. Click 'Browse Files'. 3. Select a .png file under 10MB.	File name displays in upload zone. 'Analyze File' button becomes active.	Pass	When the user uploads a .png, the image correctly uploads and the "Analyze File" button becomes active, as well as a checkmark
9	CT Scan Upload	Reject unsupported file type	1. Go to /analyze. 2. Try to upload a .pdf or .txt file.	File is rejected. Error message shown: unsupported file format.	Fail	The application accepts the image and uploads it and the "Analyze File" button appears
10	CT Scan Upload	Reject file over 10MB	1. Go to /analyze. 2. Upload any image file larger than 10MB.	File is rejected with error message indicating the 10MB size limit.	Pass	Images that are larger than 10MB show an error that explicitly says that the given image's size exceeds that amount.

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11	CT Scan Upload	Empty state shown before file selection	1. Navigate to /analyze without uploading anything.	Upload zone shows dotted border, instructions text, and 'Browse Files' button. No 'Analyze File' button visible.	Pass	When navigating to the analysis page, the user is able to read the disclaimer, see where the model data is from, and has the option to upload a file in the accepted formats (DICOM, PNG)
12	ML Inference	Inference runs client-side (no server round-trip)	1. Upload a valid CT scan. 2. Open browser network tab. 3. Click 'Analyze File'.	Image is successfully analyzed from a hosted backend server. Doesn't re-run the model again for each image.	Pass	The uploaded image is handled by the backend using the stored .pth model weights file, rather than running it again.
13	ML Inference	Returns one of six hemorrhage classes	1. Upload a labeled CT scan (e.g., known subdural). 2. Click 'Analyze File'.	Result shows one primary class from: epidural, intraparenchymal, intraventricular, subarachnoid, subdural, any.	Fail	The model only returns a binary answer (if a stroke is present or not), which is backed up by a confidence rating.
14	ML Inference	Confidence score displayed with correct tier	1. Upload CT scan and run analysis.	Confidence score shown as an indicator of how accurate the model is.	Pass	The model gives the user a confidence rating between 0.0 and 1.0, which is summarized by AI.
16	ML Inference	Low-confidence result flagged	1. Upload an ambiguous or non-CT image producing confidence < 0.60.	Result is flagged as 'Low Confidence'. User is advised to consult a medical professional.	fail	All images have a very high confidence rating, which is due to the low training dataset size. This is a next step for the project.
17	ML Inference	High-confidence result displays 'High' tier	1. Upload a clear CT scan with dominant hemorrhage pattern.	Confidence tier shows 'High' when score > 0.80.	Pass	When given an image with a clear stroke, the model predicts correctly with a confidence of 1.
18	LLM Explanation	Plain-language summary generated after inference	1. Upload CT scan. 2. Complete analysis.	AI-generated plain-language explanation of the result is displayed below the confidence scores.	Pass	AI summarizes the findings, confidence, and details of the results.
19	LLM Explanation	Medical disclaimer appended to LLM response	1. Complete an analysis and view results.	Response includes disclaimer: 'This result is not a medical diagnosis. Consult a licensed healthcare provider.'	Pass	The model informs the user that all results are not a diagnosis and are not a replacement for human clinical decisions.
20	LLM Explanation	LLM explanation references the predicted class	1. Run analysis on a scan classified as 'subdural'. 2. Read LLM summary.	Explanation mentions the specific hemorrhage type returned by the model.	Fail	The model trains on different types of stroke so that it can recognize them; however, the model does not disclose to the user what type of stroke they have (only a binary answer).
21	LLM Explanation	API failure shows graceful error	1. Disable network or revoke API key. 2. Run analysis.	UI shows a graceful error (e.g., 'Explanation unavailable') instead of crashing.	Pass	If the user is offline while trying to analyze results, the model communicates that there is an error and that their request is not possible at that moment.

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22	Feedback Form	All form fields render correctly	1. Navigate to /feedback.	Role dropdown, star rating, area dropdown, consent dropdown, two comment fields, and Submit button all visible.	Pass	All elements of the feedback page work. The user is able to select their role, rate their experience, specifically comment on our app, and indicate whether the feedback can be used to improve the app. Once the submit button is pressed, the form clears and the information is sent to the developers.
23	Feedback Form	Star rating widget works	1. Click on the 3rd star in the rating widget.	Rating updates to 3 stars. Stars 1–3 are highlighted; 4–5 are not.	Pass	When the user selects a star, all stars preceding that number are highlighted and all stars following are not.
24	Feedback Form	Role dropdown has all 5 options	1. Open Role dropdown.	Options shown: Medical Professional, Researcher, Patient, Student, Other.	Pass	Yes it shows the diffrent dropdown roles and allows the user to select them
25	Feedback Form	Form submission with valid data	1. Fill all fields. 2. Select role, rating, area, consent. 3. Enter comments. 4. Click Submit.	The Feedback properly submitted, and the form reset.	Pass	All elements of the Feedback Page are able to be filled in by the user. When the user chooses to submit, the form resets, indicating that it has been correctly sent to the developers.
26	Feedback Form	Submit with missing required fields	1. Leave required fields blank. 2. Click Submit.	Validation error shown. Submission blocked. Missing fields highlighted.	Pass	The form will flag the required questions, denying the user the ability to submit the form without them, but will allow optional questions to be left blank.
27	Security	No image data sent to external server during inference	1. Open DevTools Network tab. 2. Upload CT scan and run analysis.	No POST requests containing image data are made to any external URL during inference.	Pass	The POST request only contains JSON data summarizing the metadata of the current scan and passes with 200 OK.
28	Security	API keys not exposed in frontend bundle	1. Inspect Flutter web build output (main.dart.js). 2. Search for API key strings.	OpenAI API key is not present in the compiled web bundle.	Pass	The API key is stored in a .env.local file and .gitignored
29	Performance	Inference completes in under 5 seconds	1. Upload a 224×224 CT image. 2. Click Analyze. 3. Time until results appear.	Results displayed within 5 seconds of clicking Analyze on a mid-range device.	Pass	The analysis results appear within 5 seconds (closer to 3-4 seconds) of clicking the "analyze" button after file uploading.
30	Performance	App responsive on mobile viewport (380px)	1. Open app on mobile device or resize browser to 380px width.	All pages render correctly with no horizontal scroll, no overlapping elements.	Fail	Though the functions remain, some of the bottom text of the analysis page is cut off and doesn't allow the user to scroll down to read.
31	Compatibility	Runs on Chrome (desktop)	1. Open PWA URL in Chrome latest version.	All features functional; no console errors.	Pass	All pages and icons render correctly when used in Chrome.

ID#	Functionality	Scenario	Steps to be Executed	Expected Result	Pass/Fail	Comments
32	Compatibility	Runs on Safari (iOS)	1. Open PWA URL in Safari on iPhone.	All pages render; file picker works; analysis runs; no crashes.	Pass	All pages and icons render correctly when used in Safari on an iPhone. Analysis and file picker work as expected.
33	Compatibility	Runs on Android Chrome	1. Open PWA URL in Chrome on Android device.	All pages render; file picker works; analysis runs; no crashes.	Pass	All pages and icons render correctly when used on an Android device, such as the Mass Academy tablets.
34	Installation / PWA	manifest.json present and valid	1. Open DevTools → Application → Manifest.	PWA manifest loads with app name, icons, start_url, and display mode set.	Pass	The PWA manifest loads correctly always
35	API – /analyze	POST /api/analyze returns correct JSON structure	1. Send POST request with valid CT scan file to /api/analyze.	Response contains: predicted_class, confidence, confidence_tier, all_class_scores, low_confidence, llm_explanation, disclaimer.	Pass	The POST request always contains the correct JSON format
36	API – /analyze	POST /api/analyze rejects file over 10MB	1. Send POST request with file > 10MB to /api/analyze.	Returns 413 error with message about file size limit.	Pass	Passes correctly with a 413 error passed to the backend.
37	API general	API UI is at the correct relative URL and all endpoints are visible	1. Go to the relative URL for the API that is supposed to work 2. Check if all API endpoints exist and are correct	Correct API url, all endpoints visible	Pass	All API endpoints are visible and they are hosted at the correct backend relative URL
38	API – /health	GET /api/health returns ok status	1. Send GET request to /api/health.	Returns 200 with JSON: {"status": "ok"}.	Pass	Swagger API UI works correctly and all possible API responses work.
39	Usability	Stroke education cards display correctly on Home	1. Scroll through HomePage.	Stroke education cards render with titles and descriptions; no overflow or truncation.	Pass	The HomePage renders correctly and is easy to navigate.
40	Usability	Results are understandable to non-specialists	1. Complete an analysis. 2. Read LLM explanation.	Explanation uses plain language (no raw medical jargon); predicted class and confidence tier clearly labeled.	Pass	The results are clearly stated with no jargon. The confidence is displayed with a visual scale to accompany findings. All findings are clearly broken up for readability.
41	CT Scan Upload	Upload valid JPEG (.jpg) CT scan	1. Navigate to /analyze. 2. Click 'Browse Files'. 3. Select a .jpg file under 10MB.	File is accepted (README lists .jpg as a supported format). Filename shown in upload zone. 'Analyze File' button becomes active.	pass	The app takes in the image and is able to be accepted into the back end which then leads to the "Analyze Button" being active

ID#	Functionality	Scenario	Steps to be Executed	Expected Result	Pass/Fail	Comments
42	CT Scan Upload	Upload valid PNG (.png) CT scan	1. Navigate to /analyze. 2. Click 'Browse Files'. 3. Select a .jpeg file under 10MB.	File is accepted (.jpeg is listed as a supported extension in _buildUploadBox). 'Analyze File' button becomes active.	pass	The app takes in the image and is able to be accepted into the back end which then leads to the "Analyze Button" being active
43	CT Scan Upload	Reject file disguised as image	1. Rename a non CT Image 2. Attempt to upload it on /analyze.	File is rejected or analysis fails gracefully. Error message shown to user. No crash.	Fail	The app continues to analyze the image and then gives a binanry response on whether it is a stroke or not. It outputted that it was a stroke even thorugh it was a image of a sunset.
44	CT Scan Upload	Upload via drag-and-drop	1. Navigate to /analyze. 2. Drag a valid .png CT scan onto the dotted-border upload zone.	File is accepted. Filename and checkmark appear. 'Analyze File' button becomes active.	Fails	Opens a new screen with the image, but the app itself does not take in the drag and drop image.
45	LLM Explanation	LLM summary reflects confidence tier	1. Complete analysis on a scan with High confidence. 2. Read the LLM summary.	LLM explanation acknowledges the confidence tier in its language (e.g., 'with high confidence').	Pass	The LLM response is somewhat similar every time but it contains all correct and expected info.
46	LLM Explanation	Medical disclaimer text matches specification	1. Complete an analysis. 2. Locate the disclaimer text in the result.	Disclaimer reads: 'This result is not a medical diagnosis. Consult a licensed healthcare provider.' Exact match or functionally equivalent.	Pass	The disclaimer is present
47	Feedback Form	POST /api/feedback sends correct JSON schema	1. Fill out and submit the feedback form. 2. Inspect the outgoing network request.	POST body contains: ease_of_use (integer), comments (string), timestamp (ISO 8601 string). Matches the /api/feedback schema in the README.	Pass	The API response fields are correct
48	Feedback Form	ease of use field maps to star rating value	1. Select 4 stars. 2. Submit the form. 3. Inspect the POST body.	ease_of_use in the submitted payload equals 4, confirming the StarRatingWidget value is correctly mapped to the API field.	Pass	The API response is correct
49	Feedback Form	StarRatingWidget: selecting 1 star works	1. Navigate to /feedback. 2. Click the 1st star.	Only 1 star is highlighted. Stars 2–5 are not highlighted. onRatingChanged callback fires with value 1.	Pass	Only the 1st star is highlighted.
50	Feedback Form	StarRatingWidget: selecting 5 stars works	1. Navigate to /feedback. 2. Click the 5th star.	All 5 stars are highlighted. onRatingChanged callback fires with value 5.	Pass	Yes
51	Navigation	go_router: unknown route returns 404 or redirects to Home	1. Navigate to a non-existent route (e.g., /nonexistent).	go_router handles the unknown route. Either a 404 page is shown or the user is redirected to '/' — no blank screen or unhandled exception.	Fail	The router gives a GoException error, which does handle the error but still throws an exception.