
 Marwadi University Marwadi Chandarana Group	NAAC 	Marwadi University Faculty of Engineering and Technology Department of Information and Communication Technology	
Subject: Capstone Project (01CT0715)	Implementation- Continuous progress review		
Implementation	Date: 25/09/2025	Enrolment No: 92200133018	

MRI Impression Generation

Introduction

The project focuses on developing an assistive tool that supports doctors as well as radiologists in generating consistent and time-efficient MRI impressions. The system is not meant to replace medical expertise but to act as a supportive layer that reduces repetitive work and ensures accuracy.

Platform Selection

For the live deployment of the MRI Impression Assistant, we chose Hugging Face Spaces as our hosting platform. This decision was made for a few key reasons. First, its integration with the Hugging Face Hub, where our fine-tuned BioBART model is stored, is seamless.



- ✚ Second, Spaces offers native support for Streamlit applications, which meant we wouldn't have to manage complex server configurations.
- ✚ Finally, its generous free tier provided a perfect, cost-effective environment for hosting and sharing our academic project. This allowed us to focus on the application's functionality rather than on complex cloud infrastructure.


Deployment Architecture

Our deployment strategy was built on the principle of separating the large model from the application code.

- ✚ **Model :** Our fine-tuned BioBART model, which is approximately 675 MB, is hosted on its own Hugging Face Model Repository. This keeps the model's files organized and version-controlled.
- ✚ **Code :** Our application code, including the app.py script and the requirements.txt file, is hosted in a separate Hugging Face Space.

When the application starts, it dynamically downloads the model from the Hub. This hybrid architecture ensures that our application is lightweight and that the large model is managed efficiently.

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Hugging Face

Models
Datasets
Spaces
Community
Docs
Enterprise
Pricing

Vrajk / **mri-impressions**
like 1


Safetensors
bart
License: mit

Model card
Files and versions
Community
Settings

main
mri-impressions
675 MB
Go to file
Ctrl+K
1 contributor
History: 36 commits
Contribute

Vrajk	Rename biobart-mri/txt to txt	86a97df	VERIFIED	3 days ago
.gitattributes	1.57 kB	Upload 21 files	4 days ago	
README.md	24 Bytes	initial commit	4 days ago	
config.json	1.67 kB	Rename biobart-mri/config.json to config.json	3 days ago	
generation_config.json	274 Bytes	Rename biobart-mri/generation_config.json to gen_	3 days ago	
merges.txt	892 kB	Rename biobart-mri/merges.txt to merges.txt	3 days ago	
model.safetensors	666 MB	Rename biobart-mri/model.safetensors to model.sa_	3 days ago	
special_tokens_map.json	957 Bytes	Rename biobart-mri/special_tokens_map.json to sp_	3 days ago	
tokenizer.json	6.46 MB	Rename biobart-mri/tokenizer.json to tokenizer.j_	3 days ago	

huggingface.co/spaces/Vrajk/mri/tree/main


Hugging Face

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Spaces: Vrajk / **mri**
like 1
Running
Logs

App
Files
Community
Settings

main
mri
13.3 kB
Go to file
Ctrl+K
2 contributors
History: 13 commits
Contribute

Vrajk	Update src/app.py	b4bd67d	VERIFIED	2 days ago
src	Update src/app.py			2 days ago
.gitattributes	1.52 kB	Duplicate from streamlit/streamlit-template-space	3 days ago	
Dockerfile	426 Bytes	Duplicate from streamlit/streamlit-template-space	3 days ago	
README.md	369 Bytes	Update README.md	3 days ago	
requirements.txt	340 Bytes	Update requirements.txt	3 days ago	

huggingface.co/spaces/Vrajk/mri/tree/main/src


Hugging Face


Models
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Spaces: Vrajk / **mri**
like 1
Running
Logs

App
Files
Community
Settings

main
mri / src
10.7 kB
Go to file
Ctrl+K
2 contributors
History: 10 commits
Contribute

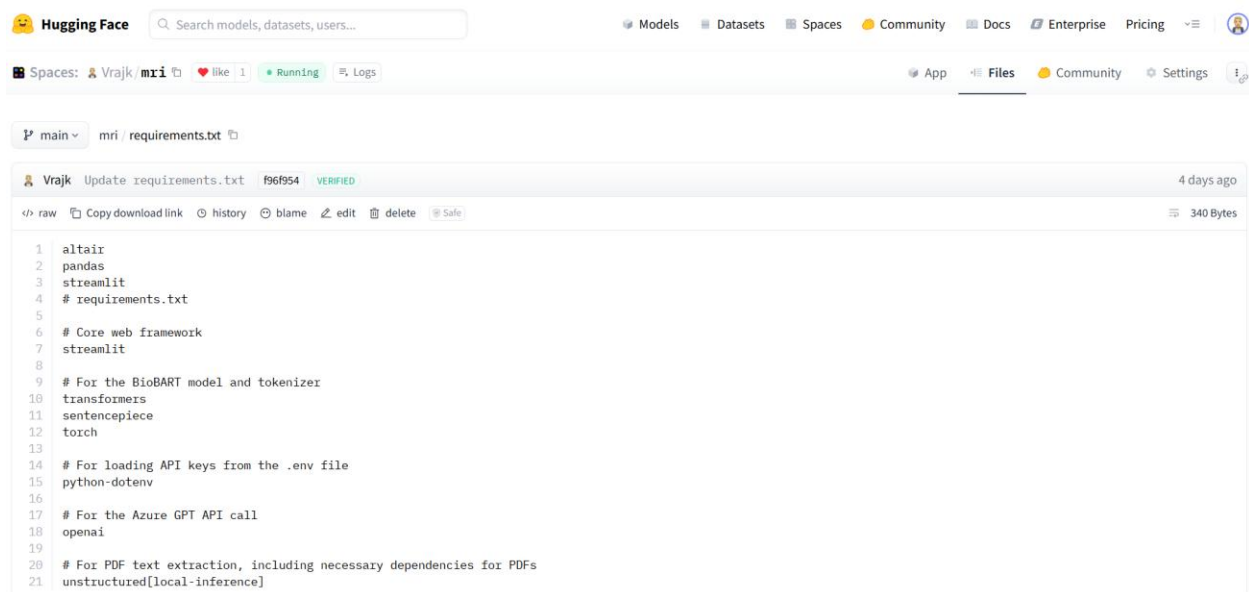
Vrajk	Update src/app.py	b4bd67d	VERIFIED	2 days ago
.streamlit	Create .streamlit/config.toml			3 days ago
app.py	Update src/app.py			2 days ago

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Configuration and Deployment Steps

The deployment was an iterative process that involved several key steps to get the application running smoothly in the cloud environment:

1. **Model Preparation:** The first step was to upload the trained model from our local system to the Hugging Face Hub using Git and Git LFS (Large File Storage) to handle the large model.safetensors file.
2. **Code Preparation:** We created the final app.py script, ensuring it loaded the model from our Hugging Face repository (Vrajkmri-impressions) instead of a local path. We also created a requirements.txt file to list all necessary libraries.





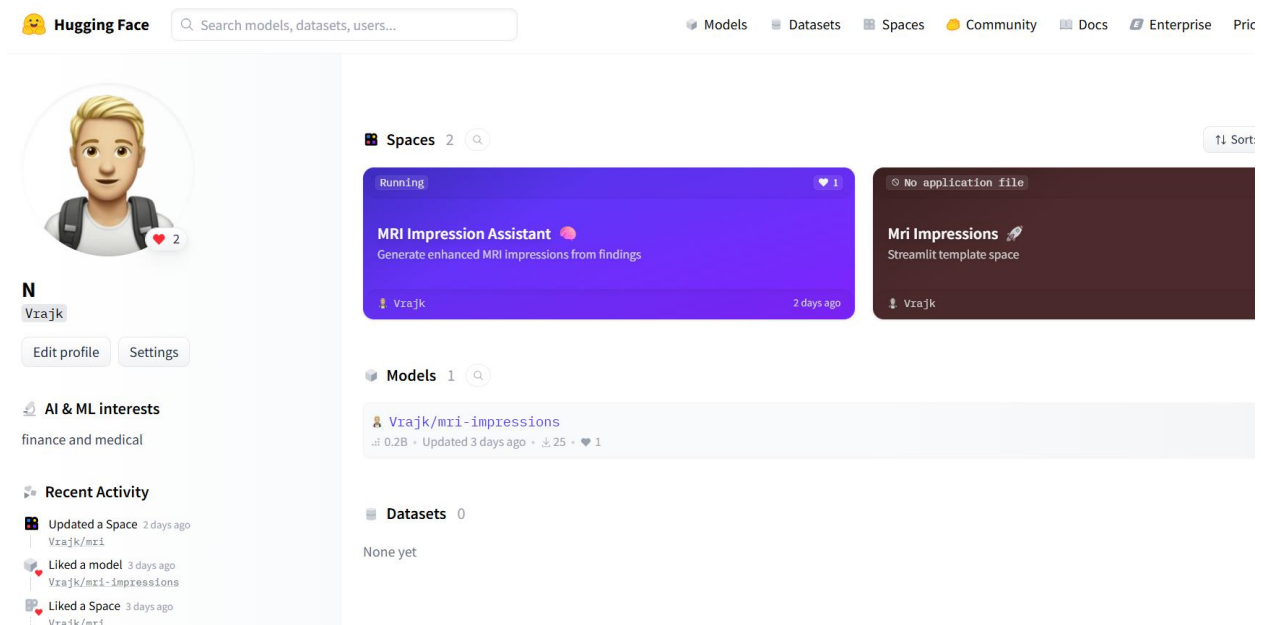
The screenshot shows the Hugging Face interface for a Space named 'mri' by user 'Vrajkmri'. The file 'requirements.txt' is selected, showing a list of dependencies. The file content is as follows:

```

1 altair
2 pandas
3 streamlit
4 # requirements.txt
5
6 # Core web framework
7 streamlit
8
9 # For the BioBART model and tokenizer
10 transformers
11 sentencepiece
12 torch
13
14 # For loading API keys from the .env file
15 python-dotenv
16
17 # For the Azure GPT API call
18 openai
19
20 # For PDF text extraction, including necessary dependencies for PDFs
21 unstructured[local-inference]
```

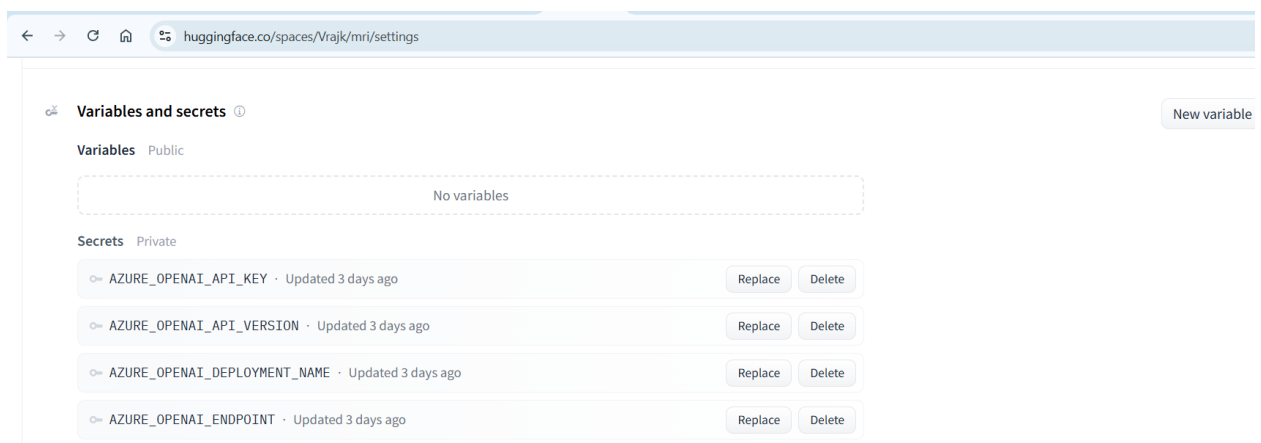
3. **Space Creation:** We created a new Hugging Face Space, making sure to select "Streamlit" as the SDK to ensure the correct environment was prepared for our app.

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The screenshot shows the Hugging Face profile of user 'VrajK'. The profile includes a bio, 'AI & ML interests' (finance and medical), and 'Recent Activity' (Updated a Space, Liked a model, Liked a Space). The main content area displays 'Spaces' (2) and 'Models' (1). The 'MRI Impression Assistant' space is highlighted, showing it is 'Running' and 'Generate enhanced MRI impressions from findings'. The 'MRI Impressions' space is also visible, showing it is a 'Streamlit template space'. The 'Models' section shows 'VrajK/mri-impressions' with a size of 0.2B and updated 3 days ago. The 'Datasets' section shows 'None yet'.

4. File Upload: We uploaded our app.py (renaming it from our local file), requirements.txt, and a special .streamlit/config.toml file to the Space.
5. Configuration & Secrets: We securely added our Azure OpenAI API keys to the "Repository secrets" section in the Space's settings. This keeps our keys safe and allows the deployed app to access them.



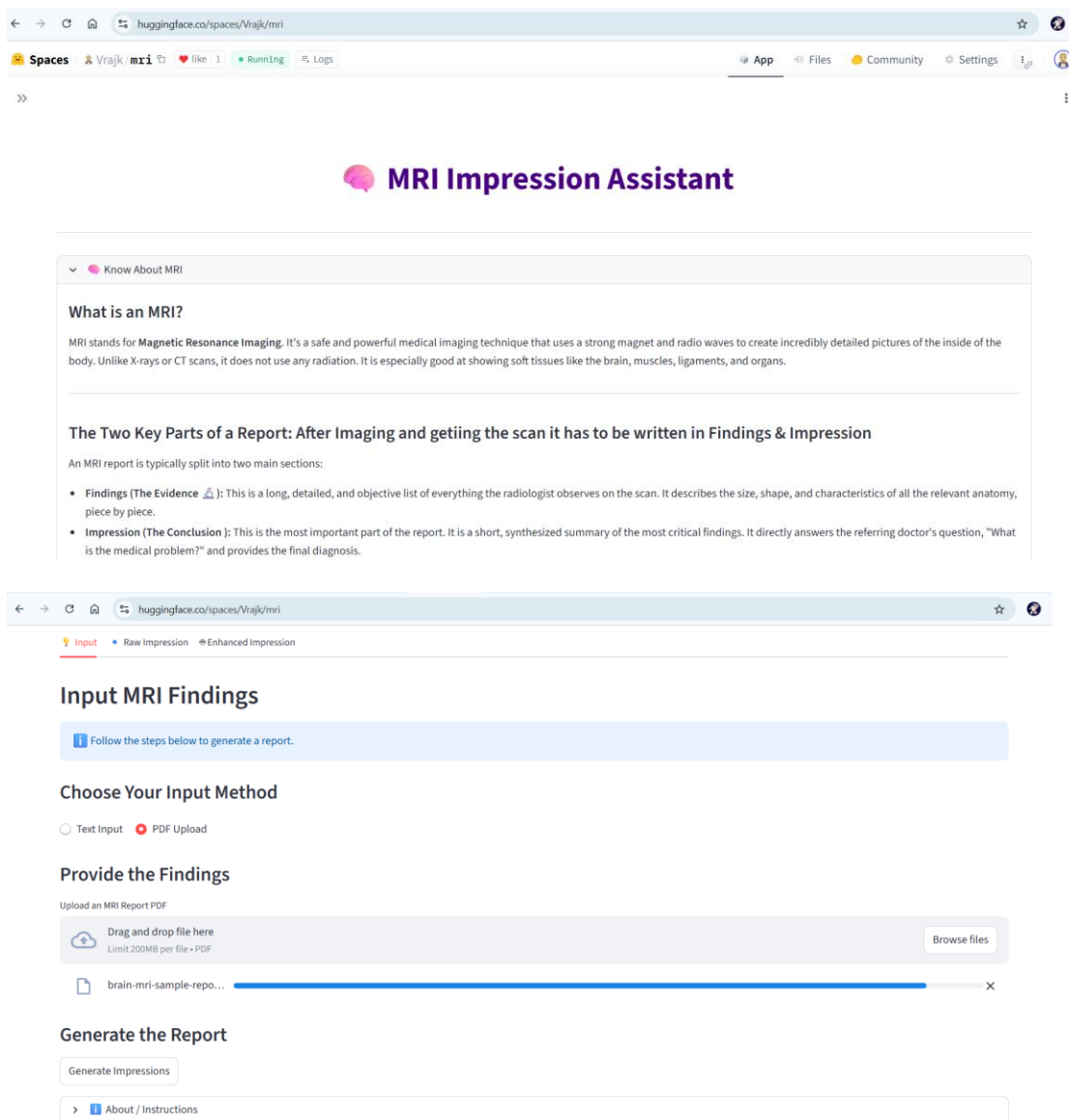
The screenshot shows the 'Variables and secrets' settings for the 'VrajK/mri-impressions' space. The 'Variables' section is set to 'Public' and shows 'No variables'. The 'Secrets' section is set to 'Private' and lists four secrets: 'AZURE_OPENAI_API_KEY', 'AZURE_OPENAI_API_VERSION', 'AZURE_OPENAI_DEPLOYMENT_NAME', and 'AZURE_OPENAI_ENDPOINT'. Each secret has a 'Replace' and 'Delete' button. A 'New variable' button is located in the top right corner.

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Live Deployment

The MRI Impression Assistant is successfully deployed and publicly accessible.


- Live URL: <https://huggingface.co/spaces/Vrajk/mri>
- Screenshots of Deployed App:




The screenshot displays the Hugging Face Spaces interface for the 'MRI Impression Assistant' application. The browser address bar shows the URL huggingface.co/spaces/Vrajk/mri. The application title is 'MRI Impression Assistant' with a brain icon. Below the title, there is a section 'Know About MRI' which includes a definition of MRI and a section titled 'The Two Key Parts of a Report: After Imaging and getting the scan it has to be written in Findings & Impression'. The main interface is titled 'Input MRI Findings' and includes a sub-section 'Choose Your Input Method' with options for 'Text Input' and 'PDF Upload'. The 'PDF Upload' option is selected. Below this, there is a section 'Provide the Findings' with a file upload area. A file named 'brain-mri-sample-repo...' is shown being uploaded. At the bottom, there is a 'Generate the Report' section with a 'Generate Impressions' button and a link to 'About / Instructions'.

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Upload an MRI Report PDF


 Drag and drop file here
Limit 200MB per file • PDF

Browse files

 brain-mri-sample-report-1.pdf 234.6KB

×

☒ Findings extracted from PDF

Edit or Add to the Extracted Findings:






There is no acute infarct seen. No intracranial hemorrhage is recognized.
 There is no parenchymal mass or mass effect.
 A developmental venous anomaly is suggested within the left parietal lobe.
 The ventricles, sulci and basal cisterns appear unremarkable.
 The vertebral and internal carotid arteries demonstrate expected flow voids indicating their patency.
 The central skull base and temporal bones are intact. The calvarium appears unremarkable. The orbits are unremarkable.
 The paranasal sinuses demonstrate mucosal thickening partially outlining anterior and posterior ethmoid air cells and the right and left antrum with a hyperplastic polypoid component along the floor. No air-fluid levels are noted.
 The nasal cavity appears unremarkable. The nasopharynx is symmetric.



Generate the Report

Generate Impressions

☐ Validating input text...



☐ Generating raw impression...









 huggingface.co/spaces/VrajK/mri

The Two Key Parts of a Report: After Imaging and getting the scan it has to be written in Findings & Impression

An MRI report is typically split into two main sections:

- Findings (The Evidence)** : This is a long, detailed, and objective list of everything the radiologist observes on the scan. It describes the size, shape, and characteristics of all the relevant anatomy, piece by piece.
- Impression (The Conclusion)** : This is the most important part of the report. It is a short, synthesized summary of the most critical findings. It directly answers the referring doctor's question, "What is the medical problem?" and provides the final diagnosis.



 Input
  **Raw Impression**
 Enhanced Impression

Raw Impression From Findings

1. Prominent bilobed right and especially left-sided paramedial extra-axial mass centered overlying the posterior frontal and anterior parietal lobes with encasement of the falx and the superior sagittal sinus with evidence of marginal dural thickening. The mass encases the right posterior falx with prominent reactive changes involving the periventricular and subcortical white matter. The findings are suggestive of a developmental venous anomaly involving the left parietal lobe. 2. Right arm weakness beginning about 4-5 months ago. 3. Right upper temporal lobe mass measuring 1.3 x 0.6 cm. 4. Right mid

▼  About / Instructions

- Step 1:** Provide MRI findings by pasting text or uploading a PDF report.
- Step 2:** The app validates the input. If it's a valid report, our model model fine tuned on mimic 4 radiology mri textual clinical data with biobart model generates a raw impression draft.
- Step 3:** An expert AI (GPT) refines this generated impression draft using the original findings to create a complete, professional mri radiology report.
- Use the tabs to navigate between the different stages of the output.

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huggingface.co/spaces/VrajK/mri

MRI Impression Assistant

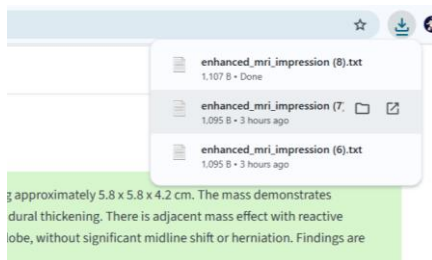
> Know About MRI

Input • Raw Impression • **Enhanced Impression**

Enhanced Impression (GPT)

1. Large bilobed extra-axial mass centered over the posterior frontal and anterior parietal lobes, predominantly on the left, measuring approximately 5.8 x 5.8 x 4.2 cm. The mass demonstrates heterogeneous signal with homogeneous enhancement, encasement of the falx and superior sagittal sinus, and associated marginal dural thickening. There is adjacent mass effect with reactive changes in the periventricular and subcortical white matter of the left frontal and parietal lobes, as well as the right posterior frontal lobe, without significant midline shift or herniation. Findings are most consistent with a meningioma.
2. Smaller enhancing extra-axial mass overlying the right mid-temporal lobe, measuring 1.3 x 0.6 cm, suggestive of an atypical meningioma.
3. No evidence of acute infarct, intracranial hemorrhage, or significant small vessel ischemic disease.
4. Developmental venous anomaly suggested within the left parietal lobe.
5. Mild mucosal thickening in the paranasal sinuses with a hyperplastic polypoid component along the floor of the maxillary sinuses. No air-fluid levels identified.

Download Enhanced Impression



huggingface.co/spaces/VrajK/mri

Input • Raw Impression • **Enhanced Impression**

Enhanced Impression (GPT)

1. Large bilobed extra-axial mass centered over the posterior frontal and anterior parietal lobes, predominantly on the left, measuring approximately 5.8 x 5.8 x 4.2 cm. The mass demonstrates heterogeneous signal with homogeneous enhancement, encasement of the falx and superior sagittal sinus, and associated marginal dural thickening. There is adjacent mass effect with reactive changes in the periventricular and subcortical white matter of the left frontal and parietal lobes, as well as the right posterior frontal lobe, without significant midline shift or herniation. Findings are most consistent with a meningioma.
2. Smaller enhancing extra-axial mass overlying the right mid-temporal lobe, measuring 1.3 x 0.6 cm, suggestive of an atypical meningioma.
3. No evidence of acute infarct, intracranial hemorrhage, or significant small vessel ischemic disease.
4. Developmental venous anomaly suggested within the left parietal lobe.
5. Mild mucosal thickening in the paranasal sinuses with a hyperplastic polypoid component along the floor of the maxillary sinuses. No air-fluid levels identified.

Download Enhanced Impression

About / Instructions

- Step 1: Provide MRI findings by pasting text or uploading an image.
- Step 2: The app validates the input. If it's a valid MRI report, it generates a raw impression draft.
- Step 3: An expert AI (GPT) refines this generated draft into a final enhanced impression.
- Use the tabs to navigate between the different stages of the process.



```
1. Large bilobed extra-axial mass centered over the posterior frontal and anterior parietal lobes, predominantly on the left, measuring approximately 5.8 x 5.8 x 4.2 cm. The mass demonstrates heterogeneous signal with homogeneous enhancement, encasement of the falx and superior sagittal sinus, and associated marginal dural thickening. There is adjacent mass effect with reactive changes in the periventricular and subcortical white matter of the left frontal and parietal lobes, as well as the right posterior frontal lobe, without significant midline shift or herniation. Findings are most consistent with a meningioma.

2. Smaller enhancing extra-axial mass overlying the right mid-temporal lobe, measuring 1.3 x 0.6 cm, suggestive of an atypical meningioma.

3. No evidence of acute infarct, intracranial hemorrhage, or significant small vessel ischemic disease.

4. Developmental venous anomaly suggested within the left parietal lobe.

5. Mild mucosal thickening in the paranasal sinuses with a hyperplastic polypoid component along the floor of the maxillary sinuses. No air-fluid levels identified.
```

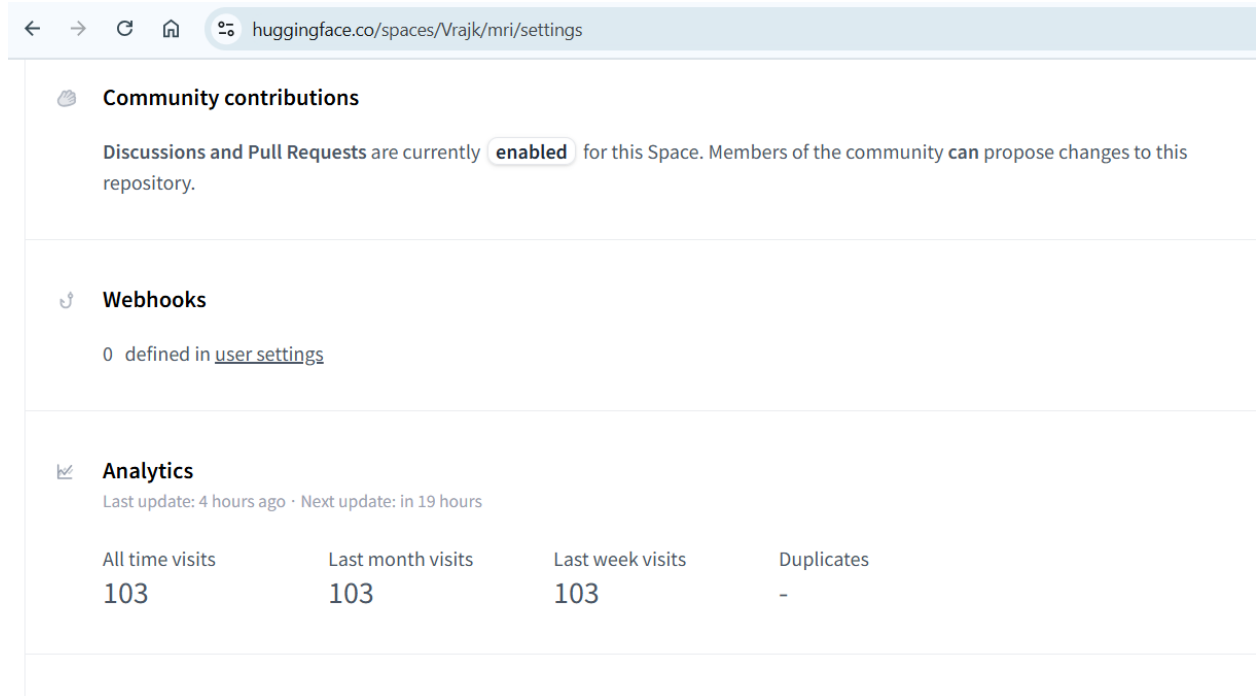

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Monitoring Setup and Tools



To ensure the reliability and performance of the deployed MRI Impression Assistant, we implemented a monitoring strategy using the native tools provided by the Hugging Face Spaces platform. This approach allows for real-time insights without the need for external infrastructure.

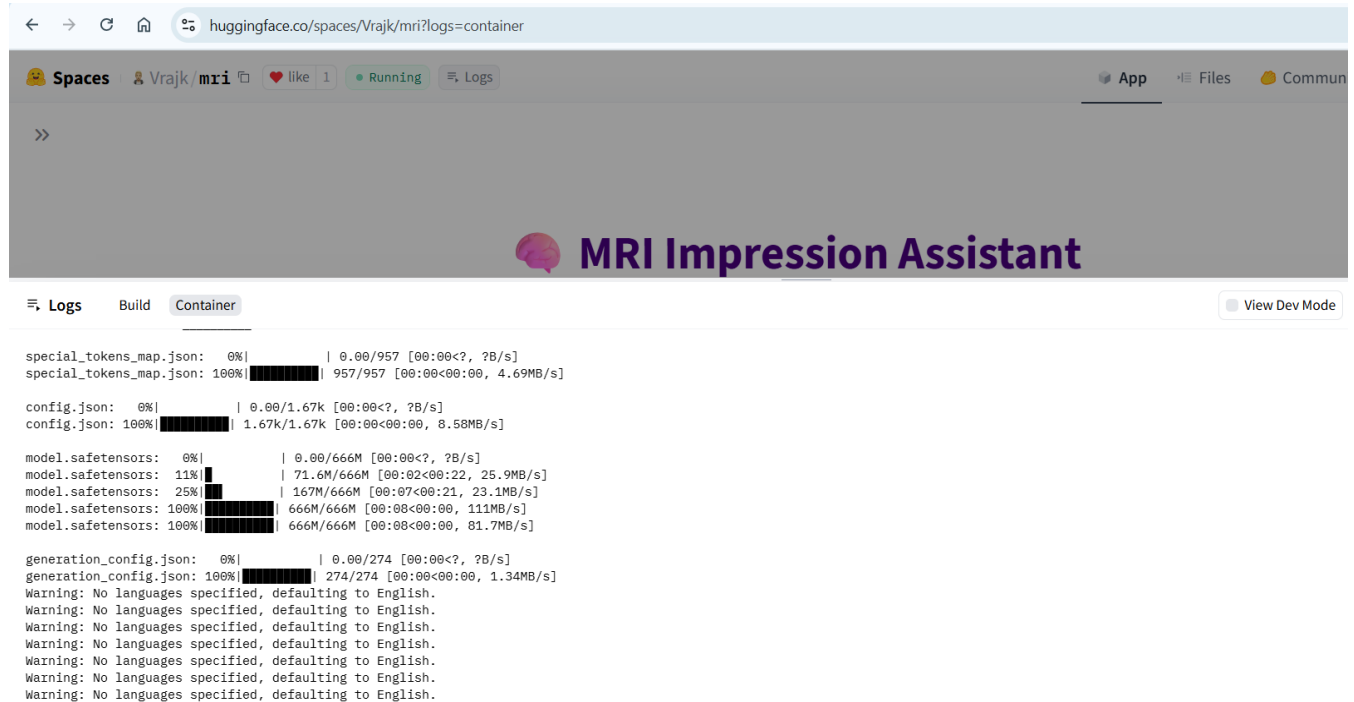
The two primary tools used are:

1. Hugging Face Spaces Analytics: A built-in dashboard that provides graphs and metrics for resource consumption.



2. Hugging Face Spaces Logs: A real-time stream of the application's console output, essential for tracking application health and debugging errors.

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The screenshot shows the Hugging Face Spaces interface for the 'MRI Impression Assistant' application. The application is running, and the logs are visible. The logs show the progress of loading the model and configuration files, with progress bars and timing information. The application is titled 'MRI Impression Assistant' and has a 'View Dev Mode' button.

```

special_tokens_map.json: 0%|          | 0.00/957 [00:00<?, ?B/s]
special_tokens_map.json: 100%|██████████| 957/957 [00:00<00:00, 4.69MB/s]

config.json: 0%|          | 0.00/1.67k [00:00<?, ?B/s]
config.json: 100%|██████████| 1.67k/1.67k [00:00<00:00, 8.58MB/s]

model.safetensors: 0%|          | 0.00/666M [00:00<?, ?B/s]
model.safetensors: 11%|███      | 71.6M/666M [00:02<00:22, 25.9MB/s]
model.safetensors: 25%|██████   | 167M/666M [00:07<00:21, 23.1MB/s]
model.safetensors: 100%|██████████| 666M/666M [00:08<00:00, 111MB/s]
model.safetensors: 100%|██████████| 666M/666M [00:08<00:00, 81.7MB/s]



generation_config.json: 0%|          | 0.00/274 [00:00<?, ?B/s]
generation_config.json: 100%|██████████| 274/274 [00:00<00:00, 1.34MB/s]
Warning: No languages specified, defaulting to English.
Warning: No languages specified, defaulting to English.
Warning: No languages specified, defaulting to English.
Warning: No languages specified, defaulting to English.
Warning: No languages specified, defaulting to English.
Warning: No languages specified, defaulting to English.
Warning: No languages specified, defaulting to English.

```

Key Performance Indicators (KPIs) & Monitoring

We identified three critical KPIs to monitor the operational performance and health of our application:

1. **Latency Monitoring (Response Time):** We measured inference latency manually during our testing phase by timing the duration from the button click to the final output. After doing the latency test on real time to generate first raw impression approx. 15 seconds it takes and after 3 seconds it gives of gpt as well , so it takes around 20 seconds , but it totally depends upon the users internet connectivity.
2. **CPU Utilization (%):** Monitored via the Analytics dashboard, this KPI shows how much processing power the application is using they give us free 16 gb to use and this application hardly requires 2 gb of ram out of 18 gb so this is easy to use for multiple interaction as well. And also the session handling is done by them toml file

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Hugging Face Search models, datasets, users...

Models Datasets Spaces Community Docs Enterprise Pricing

Spaces: Vrajik **mri** like 1 Running Logs

Want to edit your Spaces's metadata? Head to the [README.md](#) and [metadata UI](#) instead.

Space Hardware Display price: per hour per month

Choose a hardware for your Space.
You'll be billed on a per minute basis.
View usage in your [billing settings](#).

Hardware Option	Specs	Price
CPU basic (Selected)	2 vCPU · 16 GB RAM	Current · Free
CPU upgrade	8 vCPU · 32 GB RAM	\$0.03/hour
ZeroGPU	Dynamic resources · Gradio only	Free
Nvidia T4 small	4 vCPU · 15 GB RAM · 16 GB VRAM	\$0.40/hour
Nvidia T4 medium	8 vCPU · 30 GB RAM · 16 GB VRAM	\$0.60/hour
Nvidia 1xL4	8 vCPU · 30 GB RAM · 24 GB VRAM	\$0.80/hour
Nvidia 4xL4	48 vCPU · 186 GB RAM · 96 GB VRAM	\$3.80/hour

huggingface.co/spaces/Vrajik/mri

Spaces Vrajik **mri** like 1 Running Logs

CPU 0% RAM 2/18 GB

MRI Impression Assistant

huggingface.co/spaces/Vrajik/mri/settings



Community contributions
Discussions and Pull Requests are currently **enabled** for this Space. Members of the community can propose changes to this repository.

Webhooks
0 defined in [user settings](#)

Analytics
Last update: 4 hours ago · Next update: in 19 hours

All time visits	Last month visits	Last week visits	Duplicates
103	103	103	-

2 gb of ram is used out of 18 , one can easily give continuous input and process and generate the data

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Maintenance Plan

A maintenance plan is in place to ensure the long-term reliability, security, and performance of the MRI Impression Assistant. The plan is centered around three key areas:

- ✚ **Regular Updates:** Software dependencies listed in requirements.txt (like Streamlit and Transformers) will be updated on a regular schedule

The core BioBART model will be updated as needed if retraining provides significant accuracy improvements.

- ✚ **Performance and Scalability:** We will monitor application performance (CPU and Memory usage) using the built-in Hugging Face Spaces analytics dashboard.

If the application becomes slow due to high user traffic, the primary mitigation strategy is to upgrade the Space to more powerful hardware, which can be done directly in the settings.

- ✚ **Bug Fixes and Security:** Any bugs discovered in the application's code will be addressed by pushing fixes to the Space's repository, which triggers an automatic redeployment.

All secret API keys are managed securely in the Space's encrypted settings and will be rotated periodically to maintain security.

This tool is deployed to a live cloud environment on **Hugging Face Spaces**, proving its viability as a real-world tool. With a clear plan for ongoing monitoring and maintenance, this project serves as a robust proof-of-concept for how Generative AI can be effectively utilized to enhance efficiency, consistency, and quality in the field of radiology.