

# How to run

Download the python file and installation requirement from

<https://doi.org/10.5281/zenodo.15910715>.

Download the datasets from <https://figshare.com/account/articles/29643236> and

<https://zenodo.org/records/10499039>

Run it in any Integrated Development Environment or terminal in Ubuntu/Liunx.

# Demo

We further provide some of the sample inputs and outputs of the model. Inputs are the natural language questions about the images, and answers are the medical diseases (especially from VQA-MED 2021 dataset). Some of the answers are consistent with the ground truth, while others are not.

## VQA-MED 2018 dataset

Correctly Classified Samples				Wrongly Classified Samples	
Image					
Question	What does a ct scan of the abdomen show?	What does mri demonstrate?	What is most alarming about this x-ray?	What does ct show?	What shows narrowing of the svc?
Expected Answer	Multiple low density lesions on the spleen and liver	Tuberculoma	Radial head fracture	Localisation of drain that migrated in right iliac fossa	Contrast of the chest
Predicted Answer (BDI)	Non enhancing lesion	Tuberculoma	Radial head fracture	Two enlarged nodes	CT scan of chest
Predicted Answer (ADI)	Multiple low density lesions on the spleen and liver	Tuberculoma	Radial head fracture	Meningioma fossa	Lesion
Generated XAI Output					
	(a)	(b)	(c)	(d)	(e)

## VQA-MED 2019 dataset

Correctly Classified Samples			Wrongly Classified Samples	
Image				
Question	What type of contrast did this patient have?	What imaging modality is used?	Which plane is this ct scan taken in?	What is the primary abnormality in this Image?
Expected Answer	GI and IV	XR- Plain film	Coronal	Heart and great vessel
Predicted Answer (BDI)	Upper GI	XR- Plain film	Coronal	Plantar fibromatosis
Predicted Answer (ADI)	GI and IV	XR- Plain film	Coronal	Primary intraocular lymphoma
Generated XAI Output				
	(a)	(b)	(c)	(d)

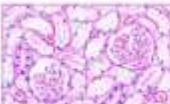
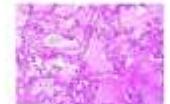
## VQA-MED 2020 dataset

Correctly Classified Samples						Wrongly Classified Samples	
Image							
Question	What is abnormal in the ct scan?	What abnormality is seen in the image?	What is abnormal in the ct scan?	What is abnormal in the mri?	What abnormality is seen in the image?		
Expected Answer	Sarcoid	Abdominal abscess	Pulmonary embolism	Aneurysmal bone cyst	Stress fracture		
Predicted Answer (BDI)	Empyema	Abdominal abscess	Pulmonary embolism	Osteoporosis	Enchondroma		
Predicted Answer (ADI)	Sarcoid	Abdominal abscess	Pulmonary embolism	Osteoporosis	Lisfranc fracture-dislocation		
Generated XAI Output							
	(a)	(b)	(c)	(d)	(e)		

## VQA-MED 2021 dataset

Correctly Classified Samples						Wrongly Classified Samples	
Image							
Question	What is most alarming about this x-ray?	What is the primary abnormality in this image?	What is most alarming about this x-ray?	What is abnormal in the x-ray?	What is the primary abnormality in this image?		
Expected Answer	Osteochondroma	Osteosarcoma	Radial head fracture	Chondrocalcinosis	Osteochondroma		
Predicted Answer (BDI)	Osteochondroma	Osteochondroma	Osteosarcoma	Osteosarcoma	Page's disease		
Predicted Answer (ADI)	Osteochondroma	Osteosarcoma	Radial head fracture	Osteosarcoma	Fat necrosis		
Generated XAI Output							
	(a)	(b)	(c)	(d)	(e)		

## Path-VQA dataset

Correctly Classified Samples				Wrongly Classified Samples	
Image					
Question	Are the nuclei of affected tubules pale ?	What show multiple small vacuoles in the cytoplasm microvesicles ?	What are congested ?	What is there increased in the red pulp, capsule and the trabeculae ?	What are the atypical dysplastic squamous cells confined to ?
Expected Answer	Yes	Hepatocytes	Alveolar capillaries	Fibrosis trabeculae	Layers of mucosa
Predicted Answer (BDI)	No	Hepatocytes	Alveolar capillaries	Sinuses	Cytoplasm
Predicted Answer (ADI)	Yes	Hepatocytes	Alveolar capillaries	Acute inflammatory	Cytoplasm
Generated XAI Output					
	(a)	(b)	(c)	(d)	(e)

## Datasets

VQA-MED 2018, 2020, 2021 and Path-VQA: <https://figshare.com/account/articles/29643236>

VQA-MED 2019: <https://zenodo.org/records/10499039>