



MedCLIP

Modelo generador de
interpretaciones para el
análisis de imágenes

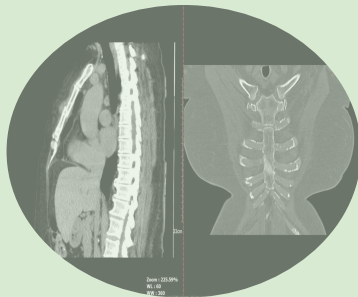
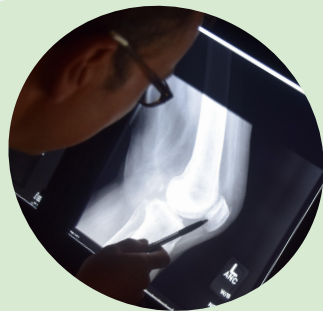


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Objetivo

Diseñar un **modelo generador de interpretaciones textuales mediante el análisis de imágenes médicas** que sea capaz de crear una descripción genérica que incluya observaciones del paciente, con información de una base de datos médica, todo con objetivo de mejorar la eficiencia en la interpretación radiológica.





Bases de Datos

MedPix

34 columnas - 36,611 filas

Descripción en Lenguaje
Natural (Caption)

Diversidad de modalidades
en imágenes

CheXpert

19 columnas - 223,414 filas

Columnas en nomenclatura
numérica

Centralizado en Imágenes de
Pecho

Debug & Limpieza de Base Datos MedPix

Conteo final de filas 21,998

Columnas esenciales 4

Sólo incluye CT, MR, XR

Se ignoran datos corrompidos
o imágenes sin importancia

ID	Image_URL	Caption	Plane	Core_Modality	Category
0	https://medpix.nlm.nih.gov/images/full/synpic1...	Sagittal thoracic and sternum coronal views il...	Multiple or Montage	CT	Trauma
1	https://medpix.nlm.nih.gov/images/full/synpic1...	Sagittal thoracic and sternum coronal views il...	Multiple or Montage	CT	Trauma
2	https://medpix.nlm.nih.gov/images/full/synpic1...	Sagittal thoracic and axial views depicting pl...	Multiple or Montage	CT	Trauma
4	https://medpix.nlm.nih.gov/images/full/synpic1...	T2 weighted sagittal and axial view at C3-C4 l...	Multiple or Montage	MR	Trauma
5	https://medpix.nlm.nih.gov/images/full/synpic1...	T2 weighted sagittal and axial view at C4-C5 l...	Multiple or Montage	MR	Trauma
6	https://medpix.nlm.nih.gov/images/full/synpic1...	T2 weighted sagittal and axial view at C5-C6 l...	Multiple or Montage	MR	Trauma
7	https://medpix.nlm.nih.gov/images/full/synpic1...	T2 weighted sagittal and axial view at C6-C7 l...	Multiple or Montage	MR	Trauma
8	https://medpix.nlm.nih.gov/images/full/synpic1...	T2 weighted sagittal and axial view at L3-L4 l...	Multiple or Montage	MR	Trauma
9	https://medpix.nlm.nih.gov/images/full/synpic1...	T2 weighted sagittal and axial view at L4-L5 l...	Multiple or Montage	MR	Trauma
10	https://medpix.nlm.nih.gov/images/full/synpic1...	T2 weighted sagittal and axial view at L5-S1 l...	Multiple or Montage	MR	Trauma

Debug & Limpieza de Base de Datos CheXpert

	Path	Frontal/Lateral	AP/PA	Caption
0	CheXpert-v1.0-small/train/patient00001/study1/...	Frontal	AP	No Finding
1	CheXpert-v1.0-small/train/patient00002/study2/...	Frontal	AP	Lung Opacity, Fracture
2	CheXpert-v1.0-small/train/patient00002/study1/...	Frontal	AP	Lung Opacity, Fracture
3	CheXpert-v1.0-small/train/patient00002/study1/...	Lateral	NaN	Lung Opacity, Fracture
4	CheXpert-v1.0-small/train/patient00003/study1/...	Frontal	AP	Edema, Pneumothorax
5	CheXpert-v1.0-small/train/patient00004/study1/...	Frontal	PA	No Finding
6	CheXpert-v1.0-small/train/patient00004/study1/...	Lateral	NaN	No Finding
7	CheXpert-v1.0-small/train/patient00005/study1/...	Frontal	PA	No Finding
8	CheXpert-v1.0-small/train/patient00005/study1/...	Lateral	NaN	No Finding
9	CheXpert-v1.0-small/train/patient00005/study2/...	Frontal	AP	Pneumothorax

Cantidad Final de Registros
219,211

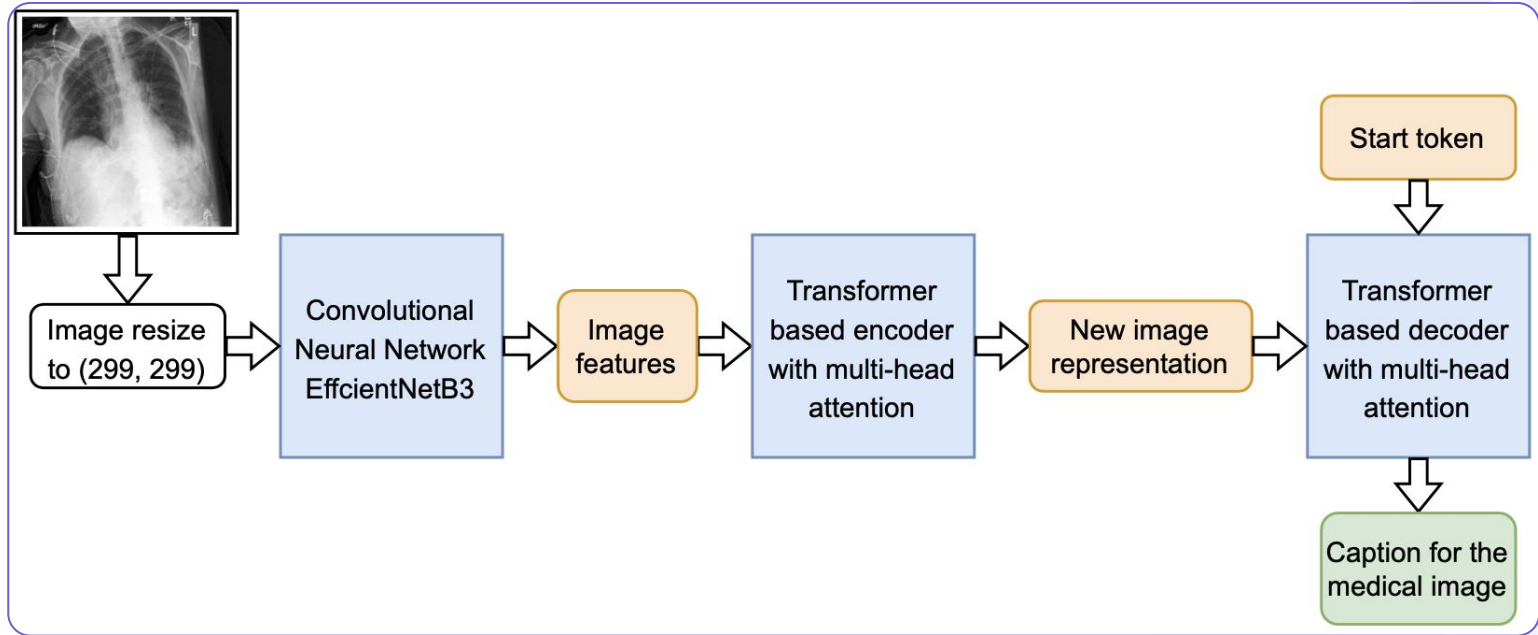
3 Columnas Principales

Eliminación de Registros con
Información Irrelevante

Globalización de Findings en
Caption

Diseño del modelo interpretador

CNN - Encoder - Decoder





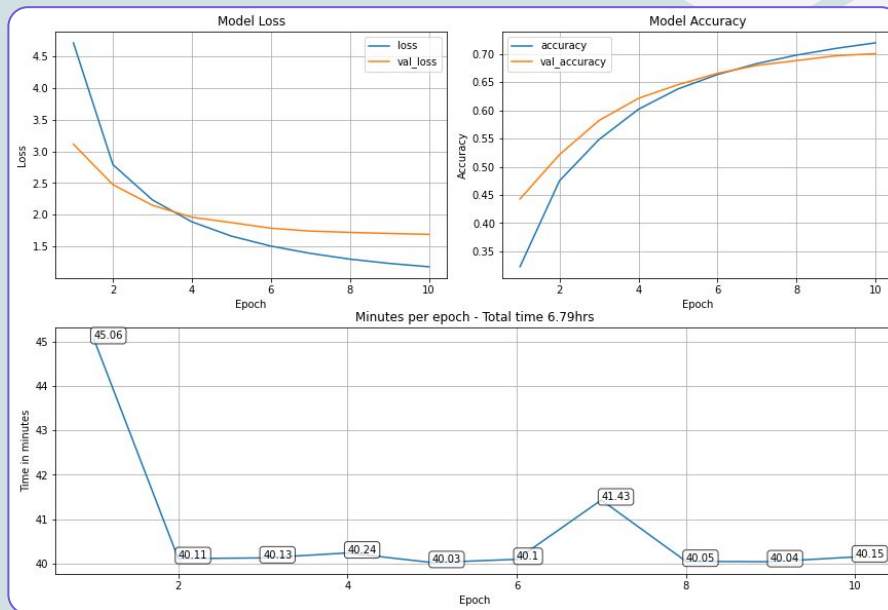
Entrenamiento del Modelo MedPix

10 Épocas

Tiempo total de 6.79hrs

Datos de entrenamiento
17,598 (80%)

Datos de pruebas 4,400
(20%)





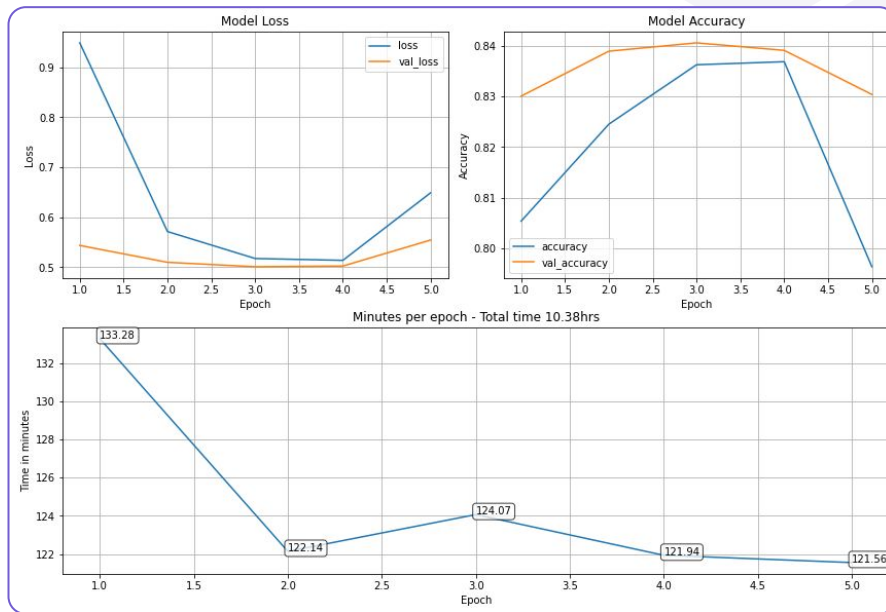
Entrenando el modelo CheXpert

5 épocas

Tiempo total 10.38hrs

Datos de entrenamiento
60,000 (80%)

Datos de prueba 15,000
(20%)



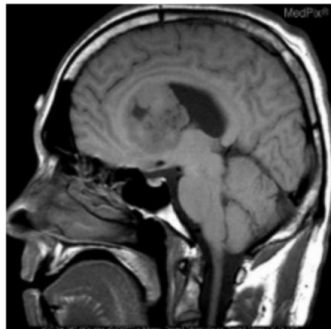
Evaluando el modelo

Prueba	MedPix	CheXpert
BLEU 1	0.217	0.691
BLEU 2	0.110	0.583
BLEU 3	0.019	0.357
BLEU 4	0.052	0.376
ROUGE-L F	0.254	0.752
ROUGE-L P	0.392	0.809
ROUGE-L R	0.205	0.718

Resultados

MedPix

Image Path: datasets/MedPix/cases_images/33083.jpg



modality: mr, plane: sagittal, category: neoplasm, glial, diagnosis: complex mass with both cystic and solid components mass appears to arise in the 4th ventricle and extends out the left foramen of luschka solid portion of mass enhances after contrast administrations is compressed and displaced to the mass

Image Path: datasets/CheXpert-v1.0-small/train/patient23056/study1/view1_frontal.jpg



CheXpert

frontal/lateral: frontal, ap/pa: ap, diagnosis: lung opacity, edema, pleural effusion



Limitaciones y mejoras

- Mayor poder computacional
- Base de datos organizado y estructurado
- Aumentar el número de datos de entrenamiento
- Validación con nuevas métricas





Referencias

- I. National Library of Medicine. (2016). *National Library of Medicine Free Online Medical Announces MedPix®, Image Database*. Retrieved November 30, 2021, from https://www.nlm.nih.gov/news/medpix_image_database.html
- II. The National Library of Medicine. (n.d.). MedPix. MedPix. Retrieved November 30, 2021, from <https://medpix.nlm.nih.gov/home>
- III. Radford, A., Kim, J. W., Hallacy, C., Ramesh, A., Goh, G., Agarwal, S., ... & Sutskever, I. (2021). Learning transferable visual models from natural language supervision. arXiv preprint arXiv:2103.00020.



iGashas! :3