



Overview of *MiReporter*:
Generating Reports for Multimodal Medical Images

Xuwen Wang, Hetong Ma, Zhen Guo, Jiao Li*

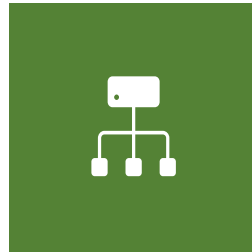
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Chinese Academy of Medical Sciences & Peking Union Medical College**

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BACKGROUND & MOTIVATION



WORKFLOW & METHODS



DEMO SYSTEM



SUMMARIZATION

BACKGROUND

Multi-modal imaging data relating to multiple organs placed great pressure on radiologists



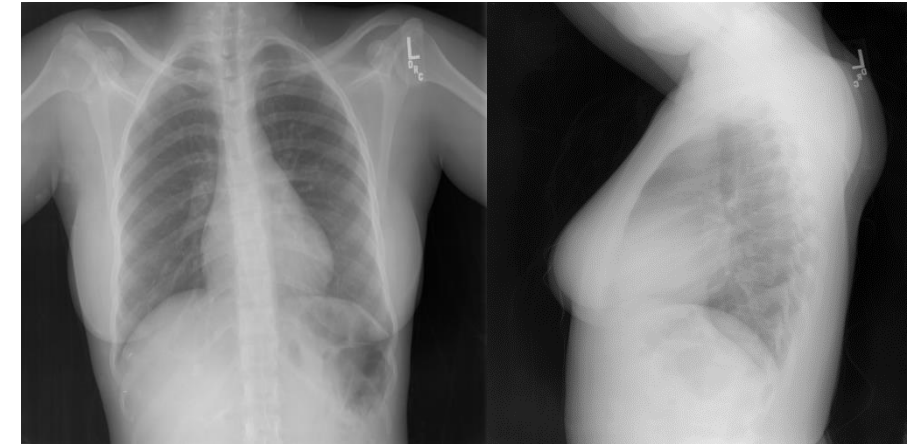
1. Pablo Messina, Pablo Pino, Denis Parra, Alvaro Soto, Cecilia Besa, Sergio Uribe, Marcelo andía, Cristian Tejos, Claudia Prieto, Daniel Capurro (2022). A survey on deep learning and explainability for automatic report generation from medical images. ACM Computing Surveys (CSUR), 54(10s), 1-40.

MOTIVATION

Medical Imaging Report Generation (MIRG)

Given as input one or more medical images of a patient, a text report is output that is as similar as possible to one generated by a radiologist.

- Integrate advanced AI technologies such as **CV** and **NLP**
- Learn a **generative model** from real imaging reports
- Consider the **diversity** on medical images as well as body regions and conditions.



ID=CXR1_1_IM-0001-4001 ID=CXR1_1_IM-0001-3001

<FINDINGS>The cardiac silhouette and mediastinum size are within normal limits. There is no pulmonary edema. There is no focal consolidation. There are no XXXX of a pleural effusion. There is no evidence of pneumothorax.

<IMPRESSION>Normal chest x-XXXX.

<MeSH>normal

Fig1. An example of imaging reports from Indiana University Chest X-ray Collection

1. Pablo Messina, Pablo Pino, Denis Parra, Alvaro Soto, Cecilia Besa, Sergio Uribe, Marcelo andía, Cristian Tejos, Claudia Prieto, Daniel Capurro (2022). A survey on deep learning and explainability for automatic report generation from medical images. ACM Computing Surveys (CSUR), 54(10s), 1-40.
2. Demner-Fushman D, Kohli MD, Rosenman MB, Shooshan SE, Rodriguez L, Antani S, Thoma GR, McDonald CJ. Preparing a collection of radiology examinations for distribution and retrieval. J Am Med Inform Assoc. 2016 Mar;23(2):304-10.

WORKFLOW

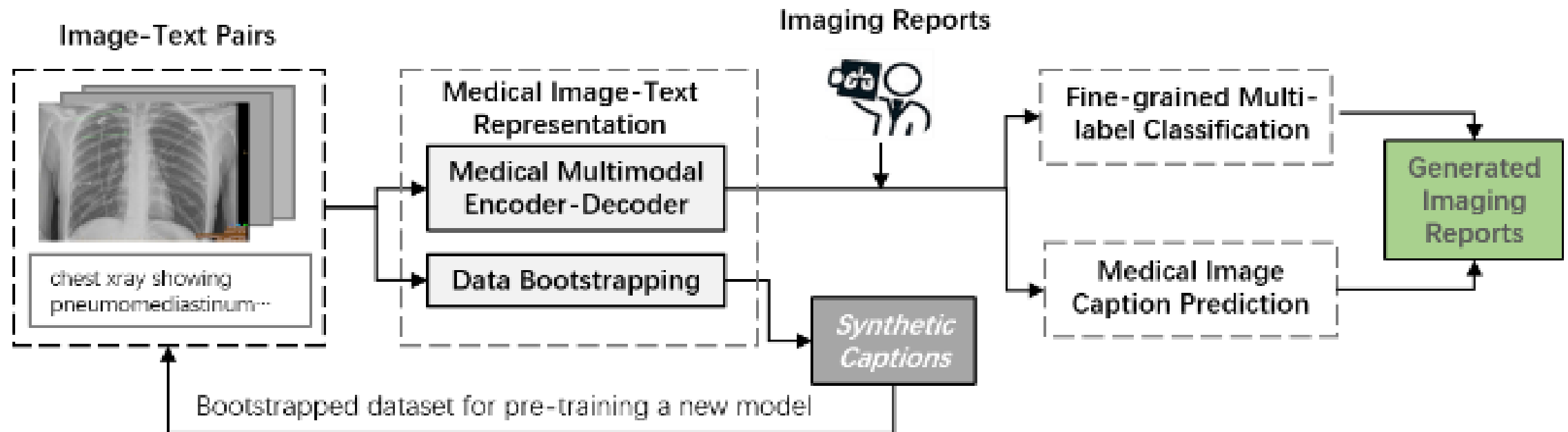


Fig2. Workflow and Framwork of MiReportor

- Xuwen Wang, Yu Zhang, Zhen Guo, and Jiao Li. 2019. A Computational Framework Towards Medical Image Explanation. In Artificial Intelligence in Medicine: Knowledge Representation and Transparent and Explainable Systems: AIME 2019 International Workshops, KR4HC/ProHealth and TEAAM, Poznan, Poland, June 26–29, 2019. Springer-Verlag, Berlin, Heidelberg, 120–131.
- Li, Junnan, Li, Dongxu, XIONG, Caiming, et al. Blip: Bootstrapping language-image pre-training for unified vision-language understanding and generation. In : International Conference on Machine Learning. PMLR, 2022. p. 12888-12900.
- Sanjay Subramanian, Lucy Lu Wang, Sachin Mehta, Ben Bogin, Madeleine van Zuylen, Sravanthi Parasa, Sameer Singh, Matt Gardner, Hannaneh Hajishirzi. MedlCaT: A Dataset of Medical Images, Captions, and Textual References,2020
- O. Pelka, S. Koitka, J. Rückert, F. Nensa und C. M. Friedrich. Radiology Objects in COntext (ROCO): A Multimodal Image Dataset, Proceedings of the MICCAI Workshop on Large-scale Annotation of Biomedical data and Expert Label Synthesis (MICCAI LABELS 2018), Granada, Spain, September 16, 2018, Lecture Notes in Computer Science (LNCS) Volume 11043, Page 180-189.

METHODS

- **Fine-grained Multi-label Classification**

- MedCC
- TMRGM

- **Medical Image Caption Prediction**

- BLIP-based Captioner
- TMRGM

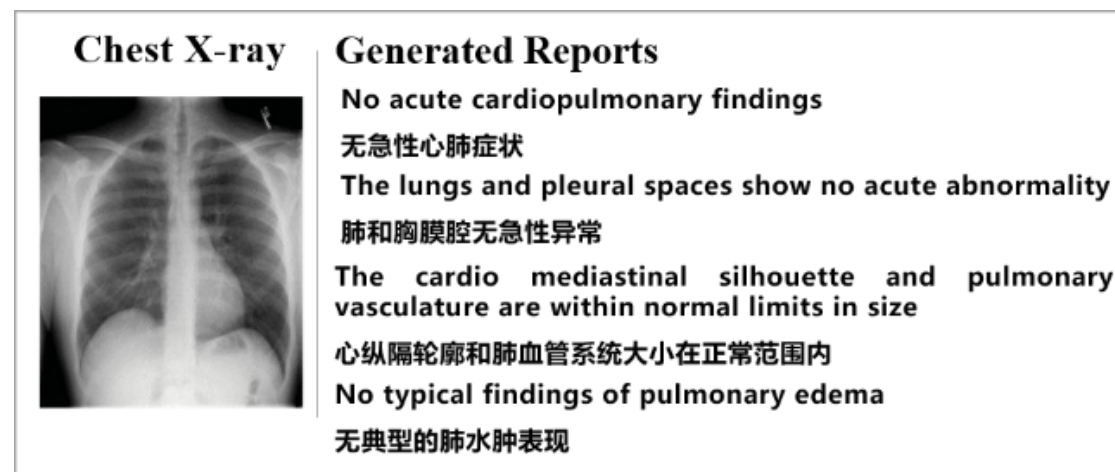


Fig3. An example of imaging report generated by MiReporter

Table 1. Preliminary results of Chest X-ray Report Generation

Method	BLEU-1	BLEU-2	BLEU-3	BLEU-4	METEOR	ROUGE	CIDEr
TieNet (Wang, 2018)	0.286	0.160	0.104	0.074	0.108	0.226	--
CoAtt (Jing, 2018)	0.303	0.181	0.121	0.084	0.132	0.249	0.175
Adapt-att	0.378	0.255	0.185	0.138	0.162	0.316	0.387
BLIP-based Captioner	0.394	0.232	0.154	0.109	0.167	0.315	0.257
TMRGM	0.419	0.281	0.201	0.145	0.183	0.280	0.359

7. Xuwen Wang, Zhen Guo, Chunyuan Xu, Lianglong Sun and Jiao Li. ImageSem Group at ImageCLEFmed Caption 2021 Task: Exploring the Clinical Significance of the Textual Descriptions Derived from Medical Images. CEUR Workshop Proceedings (CEUR-WS.org), CLEF 2021 Conference and Labs of the Evaluation Forum, September 21–24, 2021, Bucharest, Romania

8. Xuwen Wang, Yu Zhang, Zhen Guo, Jiao Li. TMRGM: A Template-Based Multi-Attention Model for X-Ray Imaging Report Generation. Journal of Artificial Intelligence for Medical Sciences, Volume 2, Issue 1-2, June 2021, Pages 21 - 32


DEMO

MiReportor (Medical imaging Report generator)

Open accessed by <http://mireportor.com>

MiReportor 未登录

MiReportor
Medical Imaging Reporter: a computer-aided imaging report generator for understanding and interpreting multimodal medical images



拖拽图片到此处或点击上传图片

* 图片类别

请选择

* 报告标题

* 选择模型

CXR-Reportor CXR-TMRGM

清除提交

标签

+ 添加标签

检查所见

检查意见

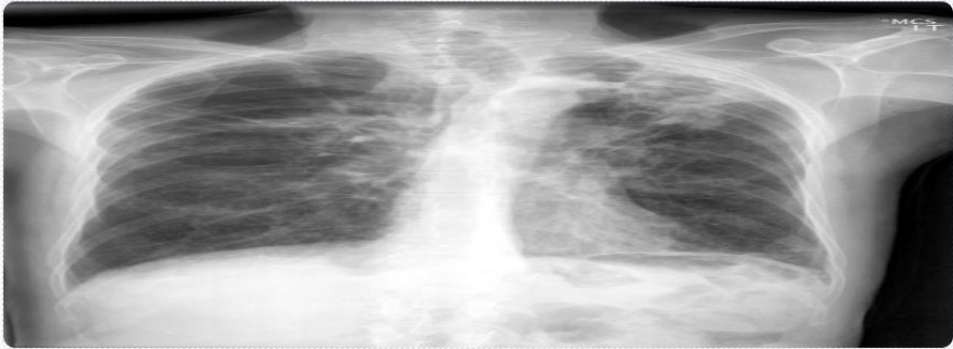
DEMO

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MiReportor 未登录

MiReportor
Medical Imaging Reporter: a computer-aided imaging report generator for understanding and interpreting multimodal medical images



* 图片类别
X-ray

* 报告标题
CXR4_IM-2050-1001

* 选择模型
 CXR-Reportor CXR-TMRGM

清除 提交

标签

opacity × degenerative change × atelectases × atelectasis × cardiomegaly × normal × scarring ×
calcified granuloma × pleural effusion × pulmonary emphysema × + 添加标签

检查所见

无急性心肺异常。没有焦点空域疾病。无气胸或胸腔积液

No acute cardiopulmonary abnormality. No focal airspace disease. No pneumothorax or pleural effusion

检查意见

SUMMARIZATION

01

We Did

Present **MiReportor**, a prototype system for interactive generation of medical imaging reports in both Chinese and English, which facilitates the human-computer collaboration practice of clinical imaging

02

We Learned

Challenges: Automatic metrics for medical correctness, Expert evaluation, Explainable and Visualization...
Inspiration: AI agent can play more roles in assisting imaging diagnosis, such as MIRG together with VQA.

03

To Do

New learning strategies and architectures, involve domain knowledge, more modalities and body region, Learn from more experts and seek for better interactive ways...

ACKNOWLEDGEMENTS

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Thanks for Listening.

