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CheXbert: Radiologist-level Automated Radiology Report Labeler using Deep Learning

The CheXbert labeler accurately detects the presence or absence of 14 common medical conditions in radiology reports, converting unstructured radiology text into a structured format. Previous approaches to report labeling typically rely either on sophisticated engineering based on medical domain knowledge or manual annotations by experts. CheXbert uses a novel approach to medical image report labeling that leverages recent advances in natural language processing. CheXbert is developed using labels provided by both board-certified radiologists and the previous state-of-the-art automatic labeler.
In experiments, CheXbert performed comparably to a radiologist and is able to outperform the previous best automatic labeler with statistical significance, setting a new state-of-the-art for report labeling on one of the largest datasets of chest x-rays. Accurate labeling of radiology text reports can enable high-quality training of AI-based medical imaging interpretation models.

Stage of Development

- Software has been trained on free text radiology report impressions and can be used to extract conditions from new radiology reports

Applications

- Radiology report labeling of medical conditions from free text radiology reports
- Aid in development of an automatic chest x-ray imaging model

Advantages

- **Outperforms the previous best radiology report labelers** with statistical significance, achieving the current state-of-the-art
- Automatic and Accurate
- Leverages recent advances in natural language processing (NPL)
- Labeler can utilize both expert annotations and existing labelers' outputs on radiology reports
- No manual annotation or fine-tuning required for use with data from a different hospital
- Unlike previous rules-based report labelers, further fine-tuning and improvement is possible with more data, if available, without coding expertise

Publications

- Smit, A., Jain, S., Rajpurkar, P., Pareek, A., Ng, A. Y., & Lungren, M. P. (2020). CheXbert: Combining Automatic Labelers and Expert Annotations for AccurateRadiology Report Labeling Using BERT. arXiv preprint arXiv:2004.09167

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