Automated de-identification of case narratives using deep neural networks for the UK Yellow Card scheme

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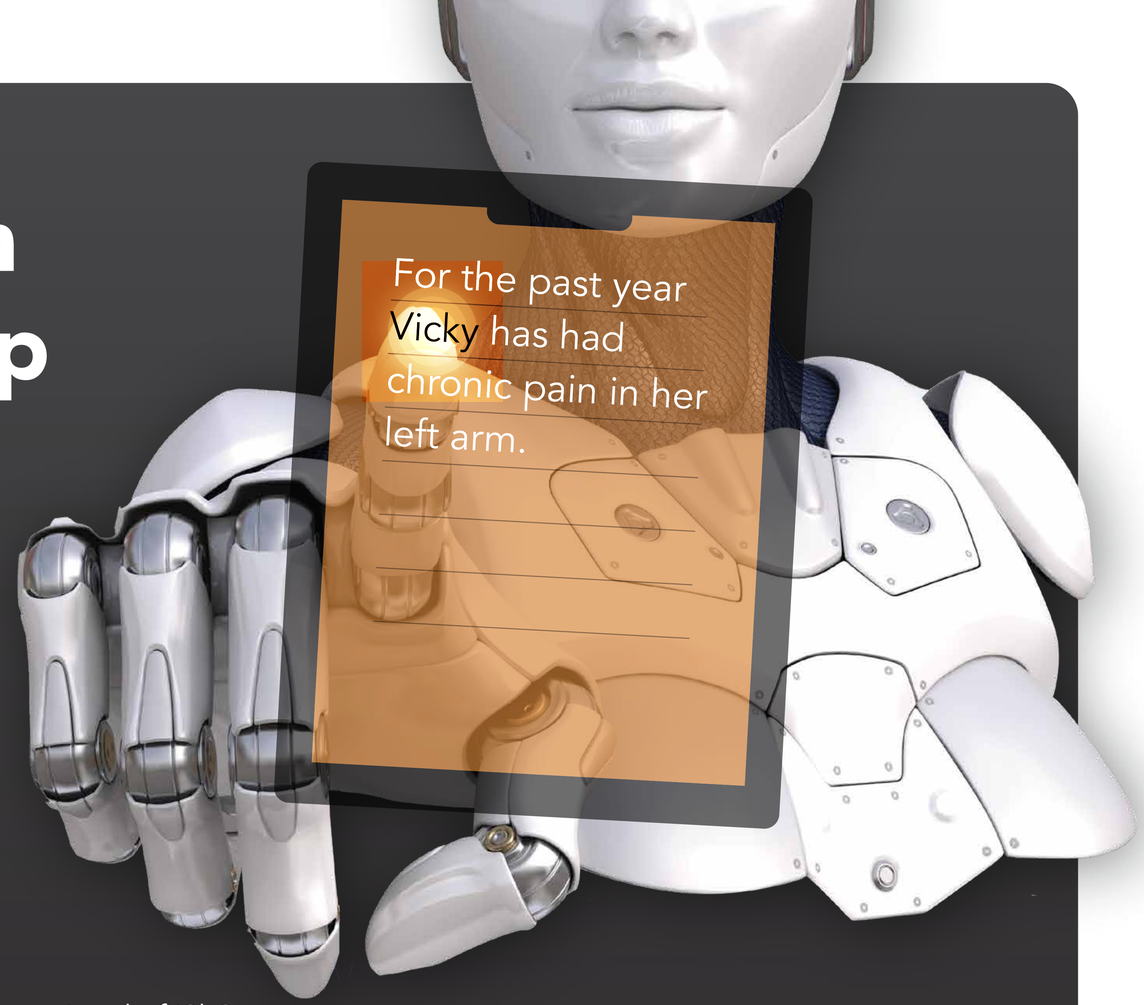


Background

Access to case narratives during signal assessment is crucial to provide a more complete picture of cases[1], however patient confidentiality needs to be considered. Sharing of narratives while preserving privacy requires de-identification. Person names – one of the more common identifiers in case narratives – can lead to (in-)direct identification of patients but are challenging to recognise in free text.

Objective

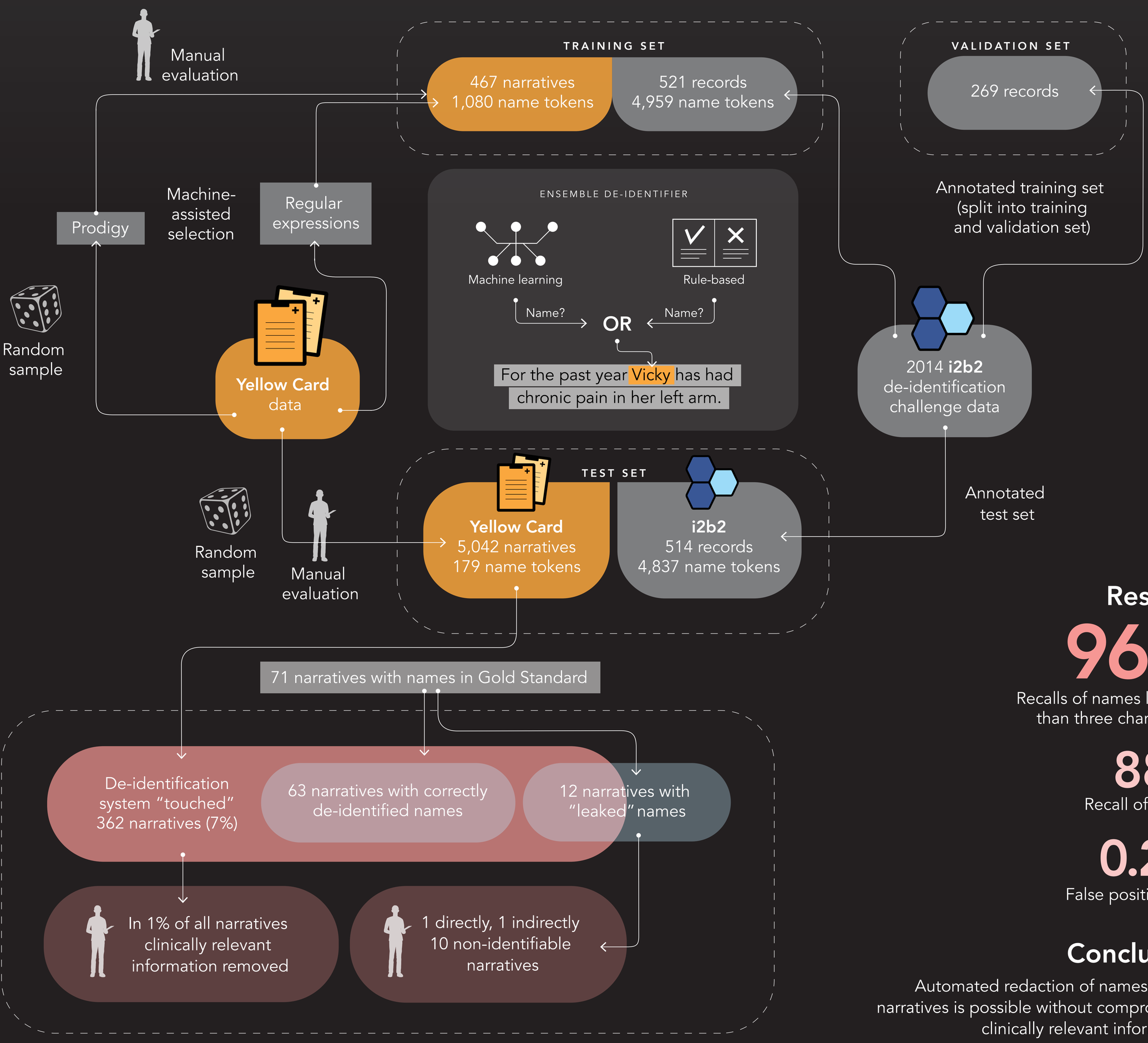
To develop and evaluate a method for automated redaction of names in case narratives.

Data

Training data consisted of i2b2 2014 de-identification challenge data[2] combined with narratives from the Yellow Card scheme[3] provided by the MHRA and annotated using two independent machine-assisted models. Model testing performed on a separate, manually annotated dataset.

Method

An ensemble combining BERT – a transformer-based neural network[4] – with hand-engineered rules for detecting names.



Results

96%
Recalls of names longer than three characters

88%
Recall of names

0.2%
False positive rate

Conclusion

Automated redaction of names in case narratives is possible without compromising clinically relevant information.

References

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2. Stubbs A, Uzuner Ö. Annotating longitudinal clinical narratives for de-identification: The 2014 i2b2/UTHealth Corpus. J Biomed Inform. 2015;58(Suppl):S20–9.
3. Medicines and Healthcare products Regulatory Agency. The Yellow Card scheme: guidance for healthcare professionals, patients and the public [Internet]. [cited 2022 May 12]. Available from: https://www.gov.uk/guidance/the-yellow-card-scheme-guidance-for-healthcare-professionals
4. Devlin J, Chang MW, Lee K, Toutanova K. BERT: Pre-training of Deep Bidirectional Transformers for Language Understanding. arXiv:181004805 [cs] [Internet]. 2019 May 24 [cited 2022 Apr 7]; Available from: http://arxiv.org/abs/1810.04805

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