ACCURACY OF NATURAL LANGUAGE PROCESSING FOR IDENTIFYING SPONDYLOARTHROPATHY IN PRIMARY CARE PATIENTS RECEIVING LUMBAR SPINE IMAGING

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DISCLOSURES

- I have no financial disclosures

INTRODUCTION

- Natural language processing (NLP) is the computational processing of common language

- The accuracy of NLP in identifying spondyloarthropathy in radiology imaging reports is unknown

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OBJECTIVE

To determine the accuracy of an NLP algorithm for identifying spondyloarthropathy in lumbar spine imaging reports

METHODS

STUDY SAMPLE

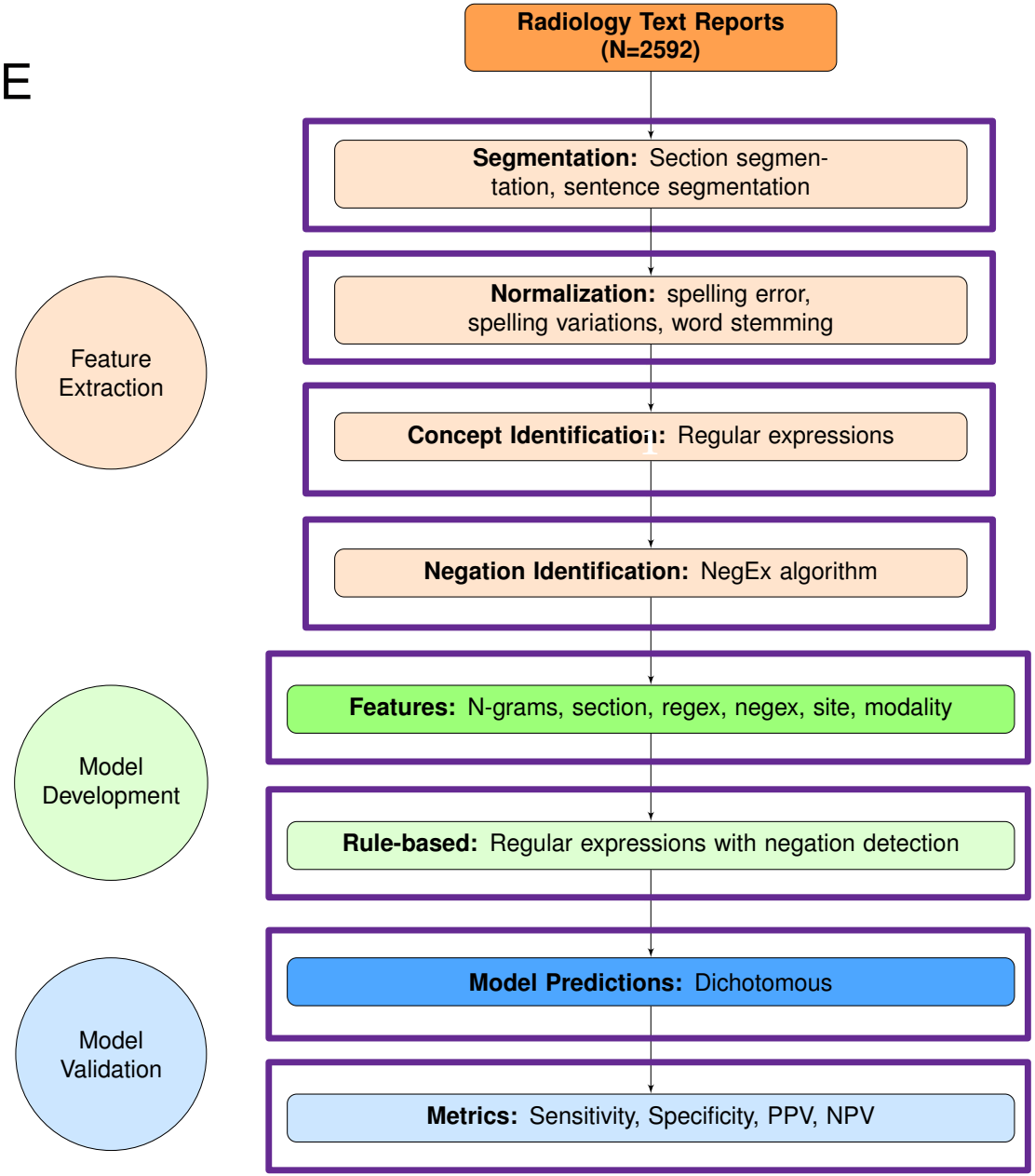
- An “imaging set” was created of lumbar spine imaging reports
- Set was enriched for spondyloarthropathy ICD 9/10 codes

REFERENCE STANDARD

- Two clinicians evaluated each report for the presence or absence of spondyloarthropathy
- Discrepancies were resolved by discussion
    - Adjudication by a neuroradiologist when necessary

METHODS

NLP PERFORMANCE



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METHODS

STATISICAL ANALYSIS

- Performance characteristics were estimated, with inverse probability weighting to account for sample enrichment
    - Sensitivity, Specificity, Positive Predictive Value, Negative Predictive Value

RESULTS

- Prevalence of spondyloarthropathy was 12%

TABLE 1: Study sample with and without spondyloarthropathy

	Imaging reports without Spondyloarthropathy	Imaging reports with Spondyloarthropathy
Number of studies	2292	302
Mean age (sd)	66.22 (15.49)	60.49 (17.64)
Image type (%)		
XR	817 (35.6)	251 (83.1)
CT	54 (2.4)	2 (0.7)
MRI	1421 (62.0)	49 (16.2)
Gender (%)		
Female	862 (40.1)	124 (42.8)
Male	1289 (59.9)	166 (57.2)
Unknown	1 (0.0)	0 (0.0)

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RESULTS

TABLE 2: NLP Performance Characteristics

	Percentage (95% confidence interval)
Sensitivity	**95%** *(92-97%)*
Specificity	**98%** *(98-99%)*
Positive predictive value	**91%** *(88-94%)*
Negative predictive value	**99%** *(99-99.9%)*

CONCLUSIONS

- NLP has high diagnostic accuracy
    - all performance characteristics >90%
- NLP may be a useful tool for identifying specific imaging findings in large datasets
- Potential applications for future research or clinical care

LIMITATIONS

- These performance characteristics reflect the case-enriched sample
  - may not be generalizable to the general population
- Incidentally, “spondyloarthropathy” was noted to be used inappropriately
  - reference to spondylosis rather than true inflammatory arthritis

ACKNOWLEDGEMENTS

This work was funded by the following grants from the National Institutes of Health (NIH):

- UH2 AT007766
- UH3 AR066795

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