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# Building an automated SOAP classifier for emergency department reports

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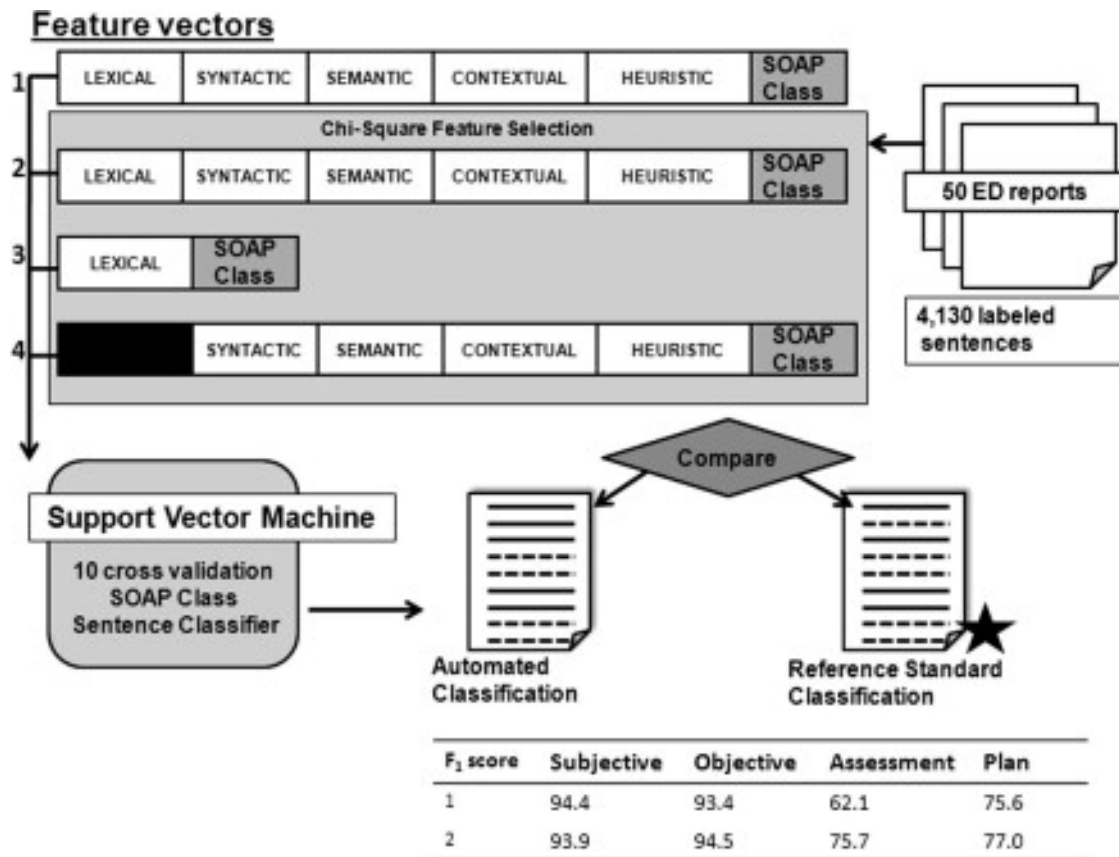
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## Abstract

Information extraction applications that extract structured event and entity information from unstructured text can leverage knowledge of clinical report structure to improve performance. The Subjective, Objective, Assessment, Plan (SOAP) framework, used to structure progress notes to facilitate problem-specific, clinical decision making by physicians, is one example of a well-known, canonical structure in the medical domain. Although its applicability to structuring data is understood, its contribution to information extraction tasks has not yet been determined. The first step to evaluating the SOAP framework's usefulness for clinical information extraction is to apply the model to clinical narratives and develop an automated SOAP classifier that classifies sentences from clinical reports. In this quantitative study, we applied the SOAP framework to sentences from emergency department reports, and trained and evaluated

SOAP classifiers built with various linguistic features. We found the SOAP framework can be applied manually to emergency department reports with high agreement (Cohen's kappa coefficients over 0.70). Using a variety of features, we found classifiers for each SOAP class can be created with moderate to outstanding performance with  $F_1$  scores of 93.9 (*subjective*), 94.5 (*objective*), 75.7 (*assessment*), and 77.0 (*plan*). We look forward to expanding the framework and applying the SOAP classification to clinical information extraction tasks.

## Graphical abstract



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## Highlights

- The SOAP framework may improve information extraction of events from ED reports.
- The framework can be applied with high agreement (Cohen's kappa  $> 0.70$  each class).
- SOAP classifiers achieve high  $F_1$  scores: 93.9 (*S*), 94.5 (*O*), 75.7 (*A*), and 77.0 (*P*).



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## Keywords

Support vector machine; SOAP notes; Problem oriented medical record; POMR;  
Prediction

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