# Bridging Boundaries: Combining Phonetic and Orthographic Information to Improve Automated Syllabification Performance

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Syllabification concerns the task of dividing words into syllables. Due to many exceptions and subword pattern interactions, training an algorithm to perform syllabification with high accuracy remains a challenge. Different syllabification algorithms have been put forth over the past few decades in the literature, both language-specific and language-independent. Syllabification algorithms can be applied to orthographic representations of words, as well as phonetic representations, and may aid in applications such as text-to-speech and spelling correction software. Given that research on Dutch syllabification algorithms is generally outdated or algorithms are not tailored to Dutch-specific language features, our research set out to apply modern deep-learning techniques for improved syllabification performance. Previously, syllabification algorithms have been applied to phonetic wordsets (e.g., Krantz et al., 2019), and orthographic wordsets (e.g., Trogkanis & Elkan, 2010); yet the two approaches have not been combined to complement each other.

A new deep-learning model was developed that combines orthographic and phonetic information from two independently trained neural nets into a unified deep-learning model using attention mechanisms. Results show that the integration of phonetic in addition to orthographic information in the deep learning model yields improvements. The mean word accuracy of 99.65% is a 0.10% improvement in comparison with the model trained solely on orthographic data, and a 0.14% improvement in comparison with the best model reported in the literature for Dutch orthographic syllabification (Trogkanis & Elkan, 2010). A similar approach using a transformer model applied to the English language achieved a 97.49% word accuracy, representing a 1.18% improvement over the orthographic-only model.

The outcome of the current research indicates that combining phonetic and orthographic information leads to increased accuracy on word processing tasks such as syllabification.

**References**

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