

AUTOMATED ASSESSMENT OF SEMANTIC CORRESPONDENCE BETWEEN BPMN MODELS AND TEXTUAL DESCRIPTIONS USING SENTENCE-BERT

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Business process modeling with BPMN is common, but ensuring models accurately reflect textual descriptions is challenging. Manual verification is time-consuming and subjective, potentially leading to inconsistencies. This work addresses the need for automated tools to assess the semantic correspondence between BPMN models and their source texts. A software application was developed that extracts task names from BPMN models to represent their action-related semantics. This extracted text is compared against the full textual process description using Sentence-BERT (SBERT) to generate meaningful embeddings. Cosine similarity between these embeddings gives a quantitative match score, indicating how well the model's tasks align semantically with the description.

The application was evaluated using data from repository [1], comprising 4 textual process descriptions and 197 corresponding BPMN models created by various authors. The tool successfully generated correspondence scores for all models, revealing significant variability, with scores ranging broadly from approximately 8% to 85% across the datasets. Analysis confirmed that higher scores correlate with models using detailed, text-aligned task names covering key process steps, while lower scores often indicate abstraction, omissions, or poor naming conventions. The distribution of BPMN models across correspondence levels visualized in a stacked bar chart (Fig. 1), highlighted distinct patterns between processes. These results demonstrate the tool's ability to quantify model-text alignment and reveal inconsistencies in modeling practices, offering potential for automated quality assessment.

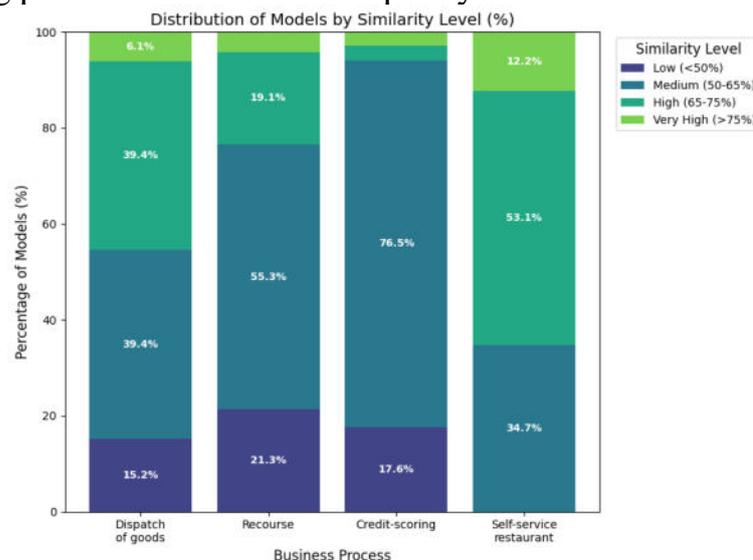


Fig. 1. – The distribution of BPMN models across correspondence levels

References:

1. BPMN for research, <https://github.com/camunda/bpmn-for-research>, 14.04.2025.