CONNECTIVITY ANALYSIS OF BUSINESS PROCESS MODELS CREATED DURING BPMN TRAINING SESSIONS

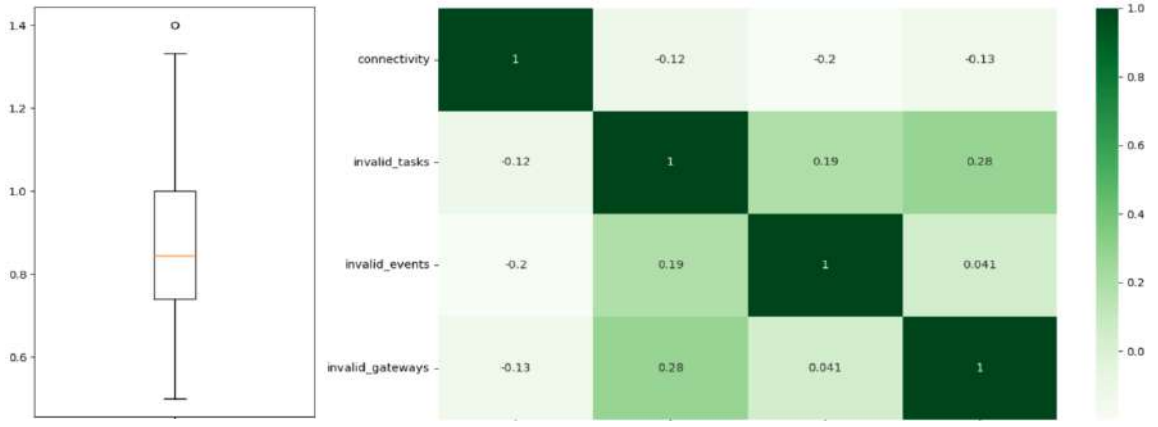
Kopp Andrii, Vlasenko Pavlo, Yamburenko Viktor, Zamkovyi Mykola
National Technical University
«Kharkiv Polytechnic Institute», Kharkiv

In this paper, we study the Coefficient of Network Connectivity (CNC) [1] of BPMN 2.0 (Business Process Model and Notation) business process models, created during training done by Master's Students taking the "Information Systems Strategy" course in the "Information Systems Software" program. CNC is one of the essential complexity metrics based on the business process size, which helps to estimate the level of business process model comprehensibility and evaluate the overall quality of BPMN models [2]. CNC is defined as the ratio between the number of arcs and the number of nodes (rarely squares of arcs and nodes are used) in the business process graph [1]:

$$CNC = \frac{Arcs}{Nodes} \text{ or } CNC = \frac{Arcs^2}{Nodes^2},$$

where *Arcs* is the number of sequence flows in a business process model; *Nodes* is the number of elements (tasks, events, and gateways) in a business process model.

We analyzed 132 BPMN models, among which 25% have CNC below 0.74, 50% have CNC between 0.74 and 1, and the rest 25% have CNC above 1. The highest CNC is 1.4, the mean CNC is 0.88, and the lowest CNC is 0.5 (see Fig. 1a). No significant correlation between CNC and invalid BPMN elements is found (see Fig. 1b), which lets us suggest that CNC does not significantly affect BPMN process model quality.



(a) (b)

Fig. 1. – CNC box-plot (a); CNC and invalid BPMN elements correlation heatmap (b)

References:

1. Fotoglou C. et al. Complexity clustering of BPMN models: initial experiments with the K-means algorithm. *Lecture Notes in Business Information Processing*. 2020. Vol.384. P. 57–69.

2. Kopp A., Orlovskyi D., Orekhov S. Towards Understandability Evaluation of Business Process Models using Activity Textual Analysis. *CEUR Workshop Proceedings (CEUR-WS.org)*. 2022. Vol. 3312. P. 200–211.