

1. Introduction

Good healthcare is an important thing needed by people and is indicated by its fast and reliable service [1]. It is necessary to provide it to help people treat their health problems. To guarantee good service, the Indonesian government has a health insurance program named Indonesia Health Social Security Agency (*Badan Penyelenggara Jaminan Sosial Kesehatan/BPJS Kesehatan*). BPJS Kesehatan offers equal and comprehensive healthcare to Indonesian citizens [2]. Using this program, they can access the primary health facility (FKTP) and advanced referral health facility (FKRTL). Currently, people still find that the quality of the service is still disappointing [1], [3], with the main concern is about the waiting time [3]. Therefore, we analyze BPJS Kesehatan processes to identify potential improvements using process mining.

Process Mining (PM) is a method to acquire insight from a business process. It is a discipline which combines process intelligence and data mining for process modelling and analysis [4]. PM aims to discover a process model from an event log, analyze the process, or give suggestions to enhance the business process. One of the most common outputs of PM is Petri net as the process model. A Petri net is a bipartite graph consisting of places and transitions [4] and is a mathematical modeling language for processes [5]. Transitions (rectangles) indicate the activities of a process. Places (circles) show the process flow and are connected to transitions by arcs. A Petri net also has tokens occupying its places representing the state of activity execution [6]. There are some algorithms for discovering a process model. One of them is Inductive Miner.

Inductive Miner (IM) is a PM algorithm that produces a process tree from an event log. The process tree is sound by construction, therefore IM is a guaranteed method for finding a sound process model from process discovery [4]. A sound model is a model that can correctly illustrate the real behavior of the process. IM works on the principle of finding the most prominent split in an event log. Then it will determine the operator between processes. Those two steps are done repeatedly until the process tree is discovered. A process tree can be easily converted into block-structured models such as Petri net or BPMN. As a method that seeks to produce a block-structured process model, IM can achieve the best fitness or precision compared to other algorithms [7]. IM has several variants.

In this study, IM and its variants are utilized to discover the process model of BPJS Kesehatan healthcare and make suggestions to improve the efficiency based on its performance. We also focus on the healthcare of respiratory disease. The discovered processes are evaluated based on four quality metrics: Fitness, Precision, Generalization, and Simplicity. The best model is selected, and then it is used to analyze the performance of the process. By doing so, we can detect which treatment procedures perform poorly and make efficiency improvement suggestions to BPJS Kesehatan. Below, we explain the method used, starting with dataset structure and preprocessing. After addressing the result, we discuss the quality of the produced process model and its performance reflecting the real healthcare processes of BPJS Kesehatan.