Chapter 6
Process Mining for Healthcare Personalization

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ABSTRACT

There are many challenges in providing high-quality and personalized treatment to an increasingly demanding patient community. Patient data and treatment data reside with various constituents, including providers, treatment researchers, health plans, employers, and even personal digital devices (i.e., home monitoring devices, Apple Health). There are tremendous opportunities in understanding and optimizing the complexities in personalized patient care and treatment—from a process perspective. A relatively new technology, process mining can fill many of the gaps in analyzing and understanding the patterns and variations of patient treatment. Process mining leverages algorithms that analyze the healthcare value chains. This paper delves deep into process mining for healthcare. Combined with process automation, process mining enables the stakeholders to act upon the process insights or re-engineer the processes to avoid bottlenecks in treatments.

INTRODUCTION

The paper explains how Process Mining can be a powerful tool to personalize treatment and improve the overall visibility and Quality of the care. Many value chains in different industries have benefited from Process Mining. It has optimized

mission-critical as well as support processes. Personalized medicine suffers from challenges typical of many industries: application siloes, inefficiencies through waste, and lack of understanding of the real processes, their variants, and root causes of inefficiencies. The paper will provide examples applicable to any industry - such as supply chain - and examples specific to Healthcare. It will then recommend best practices and reference architecture for Process Mining in personalized medicine.

EVOLUTION OF INTELLIGENT BUSINESS PROCESS MANAGEMENT

As described in (Khoshafian, 2021), Business Process Management (BPM) has been evolving with Artificial Intelligence (AI), hyperautomation, Process Mining, and Digital Technology capabilities - including responsive User Interfaces (UI), Internet of Things (IoT), and Blockchain.

To fully appreciate the significance of Process Mining in Healthcare, let us take a step back and view the entire field of medicine as a collection of Policies and Procedures. This is key. Everything we do, from medical trials, storing patient information in Electronic Medical Records (EMR), to Healthcare provisioning, involves Policies and Procedures. Now, we very quickly realize there are gaps and inefficiencies in the execution of Policies and Procedures. There are errors. There are silos. There are also dire consequences if Policies and Procedures are not followed, including the patient's possible harm or even death.

So, where are these Policies and Procedures? Here are the primary sources:

- Policy & Procedure Manuals: Whether you're dealing with operations in the front-, mid- or back-office, there are policy and procedure manuals. Healthcare practitioners, researchers, providers, and payers need to be trained to follow the documented descriptions of policies and procedures, resulting in manual, expensive, and error-prone processing.
- People's (Knowledge Workers') Heads: Often, there are designated experts, or knowledge workers, who have the policies and procedures — the business rules — in their heads. These are the researchers, the doctors, the nurses, and other knowledge (aka cognitive) workers. The challenge is to harvest the expertise.
- Legacy Code: Another source of policies and procedures is legacy code that contains business logic. The embedded policies are often ossified in legacy code with little or no business visibility. They are difficult to change or extend. The challenge is to leverage legacy systems while allowing the Healthcare organization to modernize and be agile.

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