

# Implementation of Fuzzy Miner Based on User Experience Performance

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**Abstract**—Process discovery is a technique for extracting process models from a series of activities recorded in the event log. Currently, the information system produces streaming event logs where event logs are recorded according to the time the process occurs. In today's competitive business market, user experience has an important role in determining the acceptance of software, especially websites. A website with a good user experience will provide benefits for users and businesses alike. It is essential to measure and assess a website in order to enhance its user experience. Process discovery can reveal actual product, software, or website usage patterns because process mining can draw a complete and comprehensive picture of the process. This research contributes an approach to evaluating user experience on websites by applying process mining. The algorithm used is Fuzzy Miner as a data processing algorithm because it is suitable for use when we have large data logs that are complex and unstructured, or when we want to simplify the process model at the desired level of abstraction. The expected result is to obtain website user habits from various points of view and evaluate user experience based on performance.

**Keywords**— Fuzzy Miner, performance, user experience.

## I. INTRODUCTION

Ease of access, speed and accuracy are now the basis of all systems. Information technology developers are now starting to develop systems to streamline work activities for company or agency needs, some examples are: e-commerce, hospital information system, academic information system, e-commerce, point of sales, customer relationship management system and others. In a business process system, it is the most important part of building a good system. Generally speaking, information systems now back up business operations.

Process discovery is a technique for extracting business process models from several series of activities recorded in the event log [1]. Business process models have two main benefits, namely as a tool to explain the processes that occur in the system and as the main capital in analyzing problems related to managing a series of activities. In fact, current information systems produce streaming event logs where the entire event log cannot be stored in the system [2]. Apart from that, there is the possibility of additional activities in the middle of the process so the process model is required to be able to display these additional activities. Activities carried out during the user's website usage session will be recorded, and the results of the recording when the user carries out activities on the website are called Event Logs. Using process mining, event logs can be analyzed to determine the series of activities carried out by users. Analysis of event logs on a series of user activities is carried out to determine user behavior in accessing the site.

Process Discovery is one part of process mining. Process Discovery is used to obtain a process model that represents a set of traces[3] from event logs. This research aims to analyze the user behavior. Event logs obtained from website user activity produce a series of complex and less structured processes, because users can access websites from many sources.

Fuzzy miner is a process discovery algorithm that can produce process models to visualize and simulate activities in the process. Fuzzy miner was chosen because it is suitable for exploring less structured processes that consist of many conflicting and less structured behaviors [4]. Fuzzy Miner simplifies the process model using metric significance and correlation to obtain the desired level of abstraction.

This research applies a discovery process using a fuzzy miner to analyze user experience performance from the process of using a website. The problem formulation based on the background that has been described is How to carry out process discovery in event logs using the fuzzy miner algorithm and how to analyze the user experience performance of website users based on the resulting process model?

## II. LITERATURE REVIEW

### 2.1. Mining Process

Process mining as a scientific discipline is the academic discipline of computational intelligence and data mining on the one hand, and on the other hand is the comprehensive modeling and analysis of complex processes [5][6]. The goal of Process mining is to discover, observe, and improve real processes by extracting knowledge from event logs [7]. Using process mining, event logs that can be generated from a number of applications will be modeled/mapped so that behavior can be analyzed in a case. Analytical Hierarchy Process Method

### 2.2. Fuzzy Miner

Fuzzy miner is a process mining algorithm, this algorithm is more appropriate to use to handle a number of very complex and less structured activity processes, because the resulting process model will be simplified. This is different from other algorithms, such as alpha or heuristic algorithms, which display all activities in the resulting process model without sorting out what is needed and what is not, or what could be called "spaghetti-like" [9].

Appropriate process mining techniques for less structured environments must be able to provide a high-level view of the process, eliminating (abstracting) unwanted details. Therefore, to explain how the fuzzy miner works, a road map analogy is used to explain the process of the resulting model[10][11].

### III. RESEARCH METHODOLOGY

The stages in conducting research are as follows:

#### a. Planning

At this stage the business process to be researched is studied and understood first so that it can produce the desired output.

#### b. Pre-Processing

At this stage, import the extracted dataset into the RapidMiner Studio application, then filter the dataset by determining what attributes will be displayed, then convert the dataset into. XES format so that it can be read using fuzzy miner modeling.

#### c. Mining and Analysis

At this stage, visualization of the model process is carried out using fuzzy model modeling to become an initial model, after which a threshold is determined to simplify the model process. From the simplified model process analysis can be carried out.

#### d. Evaluation

After the model process is simplified, it is then understood and the information that can be obtained is explored. If it is deemed not enough, the previous process will be repeated by changing the threshold.

### IV. RESULTS AND DISCUSSION

The Process Model produced by the Fuzzy Miner Algorithm is a Fuzzy Model. The Fuzzy Model is in the form of a process graph, making it easier for researchers to see user flow. The fuzzy miner algorithm also plays a role in simplifying the process model so that it can find out which paths are most frequently used by users. In implementing the fuzzy miner algorithm, there are path and activity parameters that can be changed according to needs. After conducting several experiments, the parameter that best represents the path most commonly used by users is the parameter with activities 100% and path 0%. Researchers can analyze the most common user journeys by using all the activities in the event log.

Activity	Frequency	Relative Frequency
tasks	1.016.897	21,32%
vacancies	828.082	15,51%
search vacancies	806.006	15,24%
cv	601.176	12,61%
home	262.261	5,50%
message	231.989	4,87%
unemployment benefit	207.077	4,34%
workmap	185.066	3,88%
my applications	132.196	2,77%
registration	121.971	2,55%

Figure 1: Page Frequency Statistics on Websites Based on the process model

you can see how many there are possibilities that a user can take in completing a session. Although a website may be designed following a tree structure, the large number of connections between pages makes it a highly connected network. Visitors don't navigate up and down different branches, they prefer to jump from one branch to another.

Users do not spend too long on the website each session. The use of each session by users tends to be short. The session with the longest time was recorded at 6 hours 32 minutes and only one session had that long. The average user spends around 15.3 minutes on the UWV website per session.

The thick red arrow shows that the page switching process takes longer than the others. The process model in Figure 3 shows that the arrow that looks thickest is when the messages page moves to the vacancies page. One possibility that causes this is users staying long enough to read their messages on that page. Moreover, the time a user moves from one page to another page tends not to be long. This could mean several things, so a deeper analysis is needed with a different approach to find out the exact cause.

Based on statistics for each group of months, there is a change in the frequency/number of accesses for each page. Most page counts increase over time. However, there are several pages that actually experience decreased access. The following is a graph of the frequency sequence of website pages per two months and a comparison graph of each page.

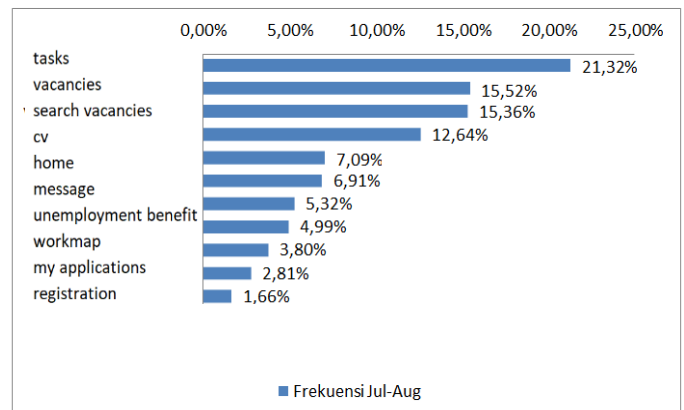


Figure 2: Website Frequency Per-Page Graph for July-August

Figure 2 displays the frequency of feature usage on a platform during July and August, showing that “tasks” was the most frequently accessed feature at 21.32%, followed by “my\_cv” and “vacancies” at around 15.5% each. “Search\_vacancies” was also heavily used, accounting for 12.64% of the total usage, indicating that users mainly focused on managing tasks and actively searching for job opportunities. The “home” and “unemployment\_benefits” features were used moderately, while features such as “workmap,” “messages,” “registration,” and “my\_applications” were used less frequently, each representing less than 6% of total usage. This pattern suggests that users primarily engage with functionalities that support active job searching and managing application-related tasks on the platform.

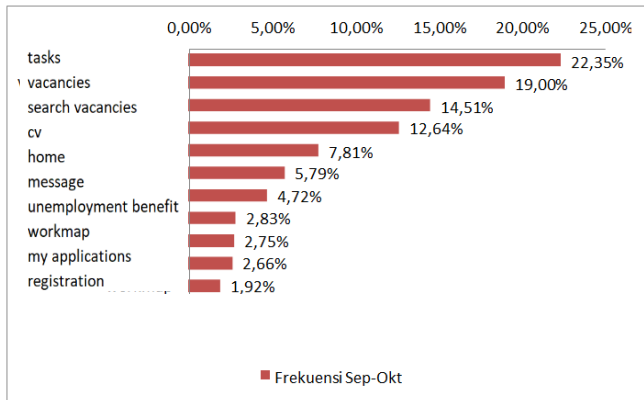


Figure 3: Website Frequency Per-Page Graph for September-October

Figure 3 shows the frequency of feature usage on a platform during September and October, highlighting that “tasks” was the most frequently accessed feature at 22.35%, followed by “vacancies” at 19% and “my\_cv” at 14.51%. “Search\_vacancies” accounted for 12.64%, indicating continued strong user focus on managing tasks and actively searching for job opportunities. The “home” feature had a moderate usage at 7.81%, while “my\_messages” and “unemployment benefits” were used at lower rates, around 5.79% and 4.72% respectively. Other features like “registration,” “workmap,” “my\_applications,” “workmap,” and “vacancies” were accessed less frequently, each below 3%, reflecting that users primarily engage with features that support task management and job search activities on the platform during this period.

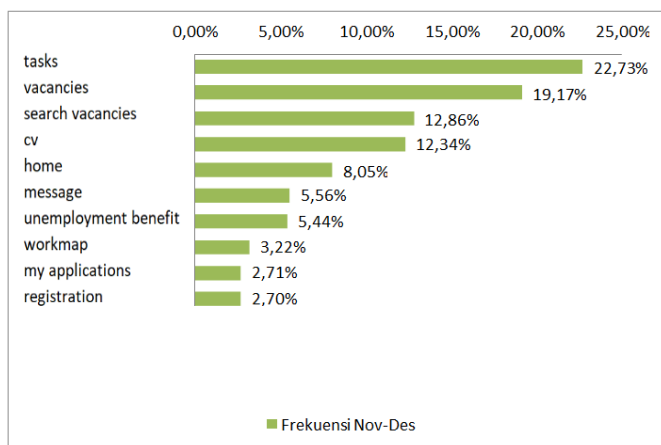


Figure 4: Website Frequency Per-Page Graph November-December

Figure 4 illustrates the frequency of feature usage on a platform during November and December, showing that “tasks” remained the most frequently accessed feature at 22.73%, followed by “vacancies” at 19.17% and “search vacancies” at 12.86%. The “cv” feature was used at 12.34%, while the “home” feature accounted for 8.05% of usage. Other features, including “message” (5.56%), “unemployment benefit” (5.44%), “workmap” (3.22%), “my applications” (3.22%), and “registration” (2.71%), had lower usage rates. This trend indicates that users consistently prioritize functionalities that support task management and job search activities, with a

continued focus on vacancies and CV-related actions on the platform during this period.

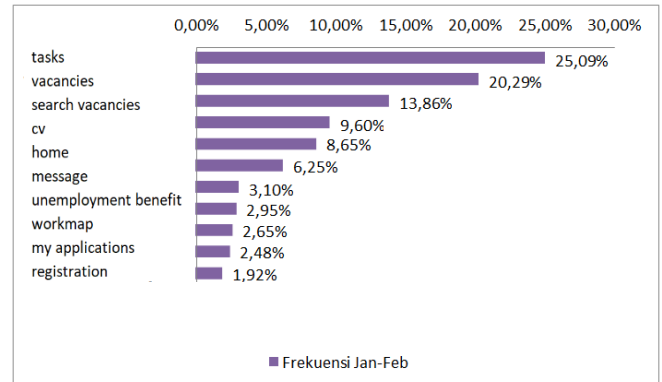


Figure 5: Frequency Graph per Website Page for January-February

The bar chart shows the frequency of page visits on a website during January and February, indicating that “tasks” was the most accessed page at 25.09%, followed by “vacancies” at 20.29% and “search vacancies” at 13.86%. The “cv” and “home” pages were used at 9.60% and 8.65%, respectively, reflecting continued user focus on job-related activities. Other pages such as “message” (6.25%), “unemployment benefit” (3.10%), “workmap” (2.95%), “my applications” (2.48%), and “registration” (1.92%) had lower visit frequencies. Overall, the graph highlights that users primarily engage with functionalities that support task completion and active job searching on the platform during this period.

## V. CONCLUSION

The first interesting fact that the event log shows is the behavior in the data appears to be very diverse. Of the 356,145 cases/session, the resulting variants were not too far from the total number of cases, namely 185,493 variants. On the site, variants are variations in the sequence of certain activities. When several cases have the same sequence variation, they will be grouped into 1 variant. In the event log on the website, the variant with the most cases only reached 1.53% of the total cases. This means that users do not have a special pattern that is very dominant when using the website.

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