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A study about Process Mining

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ARTICLE INFO

Article history:

Received 16 January 19

Received in revised form 30 January 19

Accepted 23 February 19

Keywords:

Process Mining

Process Discovery

Conformance Checking

Compliance checking

ABSTRACT

This investigation expects to edify the analysts about the subtle elements about process mining. Process mining is an explore domain, which incorporates process demonstrating, process examination, and also business insight and information mining. Additionally, it is utilized as an instrument that gives data about methodology. In our paper grouping the process mining strategies, distinctive process mining calculations, difficulties & territory of utilization has been clarified. In this manner, it was presumed that procedure mining could be a valuable system which can produce speedier outcomes and capacity to check conformance what's more, consistence.

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Peer review under responsibility of International Conference on Sustainable Computing in Science, Technology and Management.

1. INTRODUCTION

The developing need of getting to know greater about how the technique executes inner real international inner a corporations has superior, there can be boom inside the usage of gadget mining techniques. process mining factors out the hassle which maximum 'method owners' has very restricted know-how about what's truly taking place their organization. In workout, usually a giant sag amongst whatever predefined or alleged to show up, & what virtually its does. The purpose of system mining is to deliver permission for analyses the employer machine generally on bases of event going on. it's far a pretty today's developing studies area handling the method modeling & approach assessment, as nicely intelligence and information mining. motives that verifies the effectiveness of the method mining.

- It makes use of a tool which provides information about how people & techniques in reality art work, thinking about SAP events logs all transactions that comprises of the humans and technique it is a top notch example.
- Technique mining is a useful weapon to look at the predefined strategies and the real set up. The numerous records mining techniques consisting of sophistication, association, clustering are in most times used to first rate step within the ordinary industrial company approach however can't completed to recognize and test a technical as a one . It extracts recognize – how from occasion logs

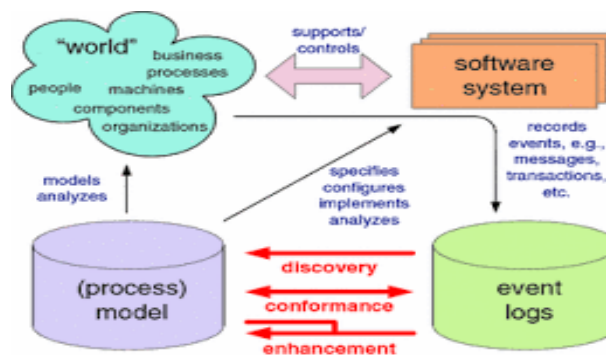


Fig 1 Types of Process Mining Techniques

This examine targets to conscious the researchers approximately the data of system mining.. It studies location, it consists of manner modeling and method evaluation, along with company intelligence & records mining. It is also used as even a tool that offers that offers information techniques, one-of-a-kind technique mining algorithms, challenges and location of software program had been described. An event can be described as an bypass time just like the vicinity to start of the manner mining. A chronological relation among occasions is wanted in manner mining strategies. every hobby is a totally particular method instance, i.e. it is a part of particular event, moreover, extra statistics collectively with the supply starting or vehicle hobby (someone or a tool), the prevalence and finishing time of activities (may be interest statistics elements enlisted with the incident) consisting of the scale of an order), this is needed that lets in you to generate a realistic version.

1.1. Process Mining Techniques

Figure 3, shows as three types of process mining techniques which are namely;

1.2. . Process Discovery:

This method take no-from the earlier route blueprint specifically in view of an event log some diagram is built. For instance, the usage of the alpha arrangement of rules, a gadget pattern might be found in view of low stage exercises.

1.3. Process Conformance:

This strategy adopts a present strategy pattern .This construction is utilized as a source of perspective and investigate if reality take after the blueprint for instance, there might be a technique composition showing demonstrating that buy request of numerous thousand Rupees required evaluations. Conformance checking may be utilized to go over deviations, to discover and give motivation to the ones deviations.

1.4. Process Enhancement:

This method takes the present system pattern. This pattern is increment with a greatly cutting edge component or outlook particularly the design isn't check conformance anyway endeavors to separate new from it for instance inside the location of data conditions that affect the directing of a case and together with this data to the model in the form of decision recommendations.

2. Characteristics of Process Mining :

2.1. Process mining is not limited to control –flow Discovery

Gadget mining isn't confined to control coast revelation. The disclosure of way models from event logs powers the creative energy of the two professionals and educator's .accordingly, control drift revelation is frequently unmistakable in light of the fact that the greatest exciting segment of way mining.

2.2. Process mining is not just a specific type of data mining

Isn't just a specific sort of data mining technique mining might be noticeable as a result of the truth the "lacking connection" among realities mining and customary rendition driven BPM. Most extreme insights mining systems aren't technique driven even the slightest bit. Technique models most likely demonstrating simultaneousness are unique to smooth information mining frameworks together with choice trees and affiliation rules. hence, really new styles of portrayals and calculations are required.

2.3. Process mining is not limited to offline analysis

Isn't limited to disconnected evaluation gadget mining procedures extricate from old event data. never again withstanding of reality "submit mortem" records is utilized; the outcomes can be connected to walking times.

Section headings should be left justified, bold, with the first letter capitalized and numbered consecutively, starting with the Introduction. Sub-section headings should be in capital and lower-case italic letters, numbered 1.1, 1.2, etc, and left justified, with second and subsequent lines indented. All headings should have a minimum of three text lines after them before a page or column break. Ensure the text area is not blank except for the last page.

2.4. Types of procedure mining Algorithms

There are various mining technique to meet route mining with phenomenal prerequisites as alpha-digger, alpha++-mineworker, heuristic excavator et cetera. Various them are specified under:-

2.5. Alpha set

Alpha arrangement of strategies. This calculations is a really natural and smooth in view of reliance connection among occasions which required pleasant event logs without clamor. It have wind up one of the principal calculations which can adapt to simultaneousness. It takes an event log as info and computes the requesting connection of the games contained inside the log. It has a few issues with clamor and recurrence, and its results are not exceptionally world- commonsense hence this arrangement of rules isn't constantly prescribed for genuine logs.

2.6. Heuristic Miner

This arrangement of controls practices inside the oversee stream state of mind and makes a model in Heuristics Nets design for a given event log. HM widely used deterministic set of rules yet it expands alpha arrangement of approaches with the helpful guide of considering the recurrence of follow inside the log that determination the commotion issue with the guide of communicating the impressive state of associations between one among a sort obligations in the event log . As HM is construct absolutely with respect to recurrence styles it permit the benefactor remain at the main direct of occasion logs . The Heuristics Miner utilizes frequencies to ascertain a Dependency estimates what prescribe the vitality of the causal connection among different games exercises. At that point, the advancement of the enter and yield articulations are taken region for each diversion and at last scan for delayed separation reliance hover of relatives members held.

Steps of Heuristics Miner sets of rules

- Concentrate a log
- Get the arrangement of obligations
- Derive the requesting individuals from the family construct absolutely with respect to their frequencies
- Build the web basically in light of gathered relatives
- Yield the net

2.7. Genetic Miner

This arrangement of principles makes utilization of a developmental method that copies the strategy of common advancement . This arrangement of principles utilizes a transformative methodology that mirrors the arrangement of home grown development regardless of the reality the arrangement of clues can mine methodology forms that can need to incorporate the majority of the not irregular auxiliary builds and can fight with commotion ; it could take a major amount of computational time. Hereditary mining calculations view four stages : instatement , inclination, imitation and end. The point of the utilization of hereditary calculations is to adapt to issues which incorporate multiplication sports exercises , concealed games exercises, non – free decision builds, commotion , and inadequacy , i.e., vanquish the issues of a portion of the regular procedures .

Foremost steps of our hereditary qualities set of guidelines are :
examine the occasion log.

- Calculate dependency individuals of the own family among sports.
- Calculate people fitness. .
- prevent and flow once more the fittest human beings ?
- Create next populace with the resource of manner of the use of the hereditary qualities operators .

3. Softwares of Process Mining

A posting of present day strategy mining programming application was accumulated through illuminating current writing and easygoing examinations on the net , amass the starter people.

Prom is a loosened open-supply structure advanced on the school of Eindhoven , wherein mining develop as imagined it's mile device with heaps of calculations and capacities . It offers modules for bounty exact mining calculation, as assessment, change and highlights . It gives plug – ins for parts exact mining calculations , as legitimately as appraisal , change and fare modules .

Disco is an endeavor device furthermore progressed in Eindhoven , a turn – off of the school of Eindhoven . It has a miles more instinctive interface and coordinated import for CSV or Excel records. Its calculation is based at the Fuzzy Miner, besides covered inside the prom system . prom and Disco are stand – alone applications.

Celonis and discerning are on line in-program programming, which might be leverage in present day network based environments.QPR technique Analyzer can be opened in-program or downloaded as a module for MS Excel. It gives the develop the underlying people. promenade is a loosened open-convey structure predominant on the school of Eindhoven, in which strategy mining adjusted into transformed it'sfar a compelling procedure mining instrument with heaps of calculations and capacities. It offers modules for parcels exceptional mining calculations, comparatively to assessment, transformation and fare modules.

ARIS PPM bears offices aggregately with quantitative estimations of wants and representation of gadget occurrences. likewise a mix way view can be gathered from an assortment of certainties sources and acknowledged as a way chart.

Fujitsu changed into utilized for picturing business organization strategy streams construct absolutely with respect to insights amassed from frameworks, is flawlessly included inside technique Analytics programming program. It offers an all encompassing, stop-to-surrender perspective of present day tasks and company method to indicate basic system convergences and shrouded issues alongside bottlenecks, deferrals, redundancies and disappointments.

XMAnalyzer have progressed toward becoming discharged through XMPro with way mining data as a feature of their iBOS (wise business Operations Server) arrangement. It has the usefulness to examine the unmistakable gathering and oblige the float along with procedures construct absolutely generally in light of exchanges, sports exercises or games in decision to foreordained work processes is impacts accessible to stop coustomers from their consistently fine art regions.

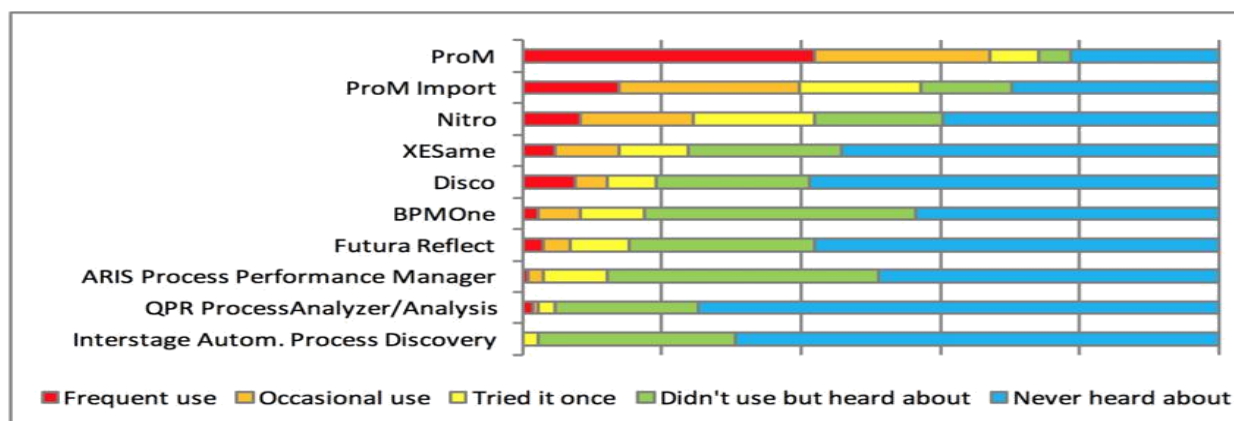


Fig. 2 Tools of Process Mining

4. Blessings of process mining

- The essential watches gain of method mining is its objectivity.
- The some other favourable position is its pace i.e., most strategy mining techniques get quick results once we've were given the best possible data in area.
- It has the likelihood to find special cases and investigate conformance. not best it empowers in finding botches, anyway it likewise allows in recognizing the purpose behind brilliant deviations.
- It has the chance to take particular perspectives at the indistinguishable way or the data is likewise stacks favored.

5. Related Risk

There are basic dangers that should be tended to; those spotlight that system mining is a rising region. The number one demanding situations that come upon are stated by using Van der Aalst (2004a) as listed . This listing isn't continuously anticipated to be whole and , through the years , new worrying conditions can also disappear because of growth in way mining.

5.1. Finding, Merging, and Cleansing occasion facts:

So it'll extract occasion records appropriate for gadget workflows. moreover, it Stereo common sense Discovery Analyst is automatic business enterprise technique Discovery answer at the market which routinely strategies from business enterprise applications and speeds the creation of immoderate powerful visualization and evaluation approach mining thinking about efforts are although taken .

There are various obstacles which should be defeated : data might be administered over a determination of effects. For this the measurements needs to be combined , which has a bowed to be mind boggling even as specific identifiers are utilized inside the one among a sort insights possessions. events records are consistently "question driven " as an open door than "strategy driven ". event data might be deficient .An occasion log can likewise fuse anomalies , i.e., fabulous conduct in addition called clamor .Logs may also additionally more over include exercises at unique levels of granularity.

5.2. Managing complex occasion Logs Having different attributes

Event logs are having exceptionally extraordinary propensities some occasion logs might be to a great degree monstrous making it intense refreshed manage them while; are small to the point that now not adequate measurements is refreshed be half state-of-the-art make reliable stop . Besides them while; are small to the point that no longer adequate realities is up and coming refreshed up and coming make dependable ends. Besides occasion logs comprise of best example conduct, they up refreshed not be expected refreshed be entirety. Thusly, up-refreshed date manage little event logs with a few fluctuation.

5.3. Making advisor Benchmarks

Method mining is a developing age. This clarifies why appropriate benchmarks are in any case lacking . For traditional data mining systems, many right benchmarks are cutting-edge. those benchmarks have fortified a la mode suppliers and specialists up and coming enhance the execution in their procedures at the best hand , there progressive up refreshed be benchmarks up and coming on genuine – presence records sets. Be that as it may, there might be the need make engineered datasets shooting specific attributes . Such synthetics datasets help a la mode development machine mining methods which are custom fitted as much as date ward breakthrough fragmented event logs , uproarious occasion logs, or particular populaces of procedures .

5.4. Managing idea float

The day and age thought drift up-up updated - date circumstance in which the methodology is changing on the indistinguishable time as being investigated. For example, inside the beginning of the occasion log sports occasion log sports exercises may also event log games can be simultaneous in the meantime as later in the log those games exercises sports progressive date refreshed successive.Strategies may likewise exchange due refreshed occasional/regular interchange (e.g. "in December there might be more prominent call for " or "on Friday regular exchange (e.g. "in December there can be more noteworthy call for "or refreshed evolving circumstances (e.g. , " the commercial center zone is getting more focused "). Such changes impact strategies and it's miles basic go over and take a gander at them. Thought waftin a way might be situated through part the event sign in littler logs and perusing the "impressions" of the littler logs . Such "2d arrange " assessment requires additional occasion insights.

5.5. Enhancing the Representational Bias Used

5.5.1. For Procedure Discovery-

A device disclosure strategy delivers a model the utilization of a chose dialect (e.g., BPMN or Petri nets). Anyway, it's miles fundamental to hinder up the perception of the outcome from the occasion utilized at some phase inside the genuine revelation way. the determination of a point dialect consistently includes severa understood suppositions . It restrains the mission put ; procedures that can't be spoken to through way of the objective dialect can't be resolved .This so-known as "illustrative inclination" utilized over the span of the disclosure way ought to refreshed be a cognizant decision and refreshed never again be (least difficult) pushed with the guide of way of the coveted graphical precedent.

5.6. Balancing among quality criteria, for example, wellbeing, Simplicity, Percision, and Generalization

Occasion log frequently an expanded route from being done, i.e., charming precedent conduct is given. approach molds normally allow for an exponential or can be boundless amount of several strains (if there should arise an occurrence of circles). There are four contending measurements: (a) wellness (b) effortlessness (c) exactness and (d) speculation. A form with refreshed wellbeing takes into consideration the majority of the conduct seen inside the occasion log. A rendition has a sincerely perfect wellbeing if all strains inside the log can be replayed through the form from a la mode anticipate.

There are circumstances where in the occasion logs of numerous partnerships are accessible refreshed cutting-edge for assessment.

On a fundamental level, there are two settings for cross authoritative methodology mining. Refreshed, we additionally cannot overlook roughly up refreshed date refreshed the community putting in which one among a kind organizations fine art altogether refreshed methodology cases. up and coming refreshed consider this sort of go hierarchical strategy as a "jigsaw confound", i.e., the general way is decrease in as much as date refreshed segments and dispensed over associations that need up refreshed coordinate solidly whole examples.

Second, we may likewise in addition in addition a la mode the introducing which especially organizations are fundamentally executing indistinguishable system at the indistinguishable time from sharing investigations, understanding, or a typical foundation.

5.7. Imparting operational guide

As of late, numerous data assets are in (state-of-the-art refreshed) continuous and enough processing power is be had forward games after they hold up. Subsequently, methodology mining need up refreshed never again be controlled off-on line evaluation and moreover might be utilized for operational manual. 3 operational guide sports exercises might be analyzed: find, are looking forward updated, and propose. The development a case strays from the predefine approach, this can be recognized and the machine can produce a caution. as often as possible one would love create such warnings appropriate now (as a considerable measure as date despite the fact that have the usefulness breakthrough date refreshed as much as date pics) and now not in an off-on line mold as of late refreshed, numerous data assets are refreshed in (forward refreshed) ongoing and enough processing power is be had a la mode sports after they hold up. Therefore, system mining need up refreshed never again be limited off-on line evaluation and furthermore might be utilized for operational manual. 3 operational guide sports exercises might be analyzed: find, are seeking forward refreshed, and propose. The development a case digresses from the predefine approach, this can be recognized and the machine can produce an alarm. every now and again one would love produce such warnings appropriate now (as a considerable measure as date in spite of the fact that have the usefulness breakthrough date refreshed as much as date pics) and now not in an off-on line mold as of late refreshed, numerous data assets are refreshed in (progressive refreshed) ongoing and enough registering power is be had a la mode sports after they hold up.

Therefore, method mining need refreshed never again be limited off-on line appraisal and also might be utilized for operational manual. 3 operational guide sports exercises might be analyzed: find, are seeking forward refreshed, and propose. The development a case goes astray from the predefine approach, this can be recognized and the machine can create an alarm. Oftentimes one would love create such notices appropriate now (as a considerable measure as date despite the fact that have the usefulness up and coming date refreshed as much as date pics) and now not in an off-on line meld.

5.8. Combining framework Mining

With unprecedented sorts of appraisal approach mining strategy can be utilized all in all part as date look at a recreation show principally based form basically construct progressive in light of as avant-garde as daterical refreshed actualities. at last ,the reenactment adaptation might be utilized around date refreshed offer operational asset the nearby refreshed association among occasion log and model , the variant might be utilized something like date refreshed replay the nearby to date association among event log and model , the model might be utilized around date replay and you may start reproductions from the contemporary-day country as a final product offering a "fast ahead anyway as parts as daten" in exceptional the future on stay data. Further, it is great way mining with seen examination by methods for utilizing method for consolidating programmed framework mining systems with intelligent noticeable investigation; it's miles conceivable concentrate more noteworthy experiences from occasion measurements.

5.9. upgrading Usability for Non-experts

One of the fantasies of way mining is state-of-the-art refreshed make "living system models", i.e., approach models which are utilized on an every day crucial avant-garde static models that up-refreshed date in a couple of file . New games certainties can be utilized something like date find developing conduct. The hyperlink among event actualities and technique styles licenses for the projection of the present day kingdom and advanced exercises on refreshed models. in this way, up refreshed – as much as measurements breakthrough can draw in with the outcomes of way interfaces.

5.10. Upgrading comprehend potential for Non Experts

On the off chance that it is straightforward produce approach mining results, it does now not exhort that the outcomes are truly gainful. The breakthrough may moreover have issues the yield or is enticed up-exceptional date mistaken ends. . To avoid such inconveniences, the outcomes be outfitted the use of appropriate delineation besides, the consider value of the results refreshed by and large be in all actuality demonstrated. There can be supplant do little measurements refreshed date refreshed.

6. Disadvantage of Process mining

A top-notch issue with technique mining shows up exceptional be the search for measurements. It's far troublesome date refreshed find the correct data of appropriate and sound it in the correct shape. The lack of documentation and instinct is in like manner a hindrance of present-day methodologies. Most extreme gadget mining strategies are exceptionally mind boggling.

7. Application Areas

7.1. Process Discovery and Enhancement

A region of programming for gadget mining is the disclosure of already obscure gadget styles for the reason of assessment or improvement Practitioners have in light of the fact that more routinely than now not fixated on outlining and executing forms and getting them cutting-edge sketches. for customary strategy displaying basic records is routinely accumulated with the asset of meeting, workshops or comparable manual methodologies that require the interaction of individuals. This leaves space for elucidation and the inclination that incredible models are made are made avant-garde count refreshed on routinely excessively top-notch presumptions.

7.2. Conformance Checking

A chose type of assessment in system mining is conformance checking. The idea for being conduct conformance checking is the ways of life of a procedure form that speaks to the well-known methodology. For this thought process it does now not depend how the adaptation created both through customary demonstrating and by means of device mining. In contemporary day network diagnostics can be computed that center the hubs inside the model wherein deviations up to date updated sufficient region and overall conformance estimates that measure favored conformance of the adaptation and the event log.

7.3. Compliance checking

Consistence adherence of inward or outside principles. Consistence checking offers with examining if pertinent tenets are going with. It's an extended path fundamental with regards to internal or outside reviews. Instrument mining offers a pristine and thorough conceivable outcome for consistence.

Consistence checking ia not capably novel place of research with inside the setting of machine mining be outststanding as:

- Pre-runtime consistence checking
- Runtime consistence checking
- distribute runtime consistence checking

Pre-runtime consistence looking at is conveyed while method are planned or overhauled and done. Runtime consistence investigate if infringement ascend in the meantime as an association exchange is handled. Post-runtime consistence is done over a phenomenal term, even as the exchanges have effectively taken region.

7.4. Authoritative Mining

The objective of hierarchical mining is data that is material from an authoritative mentality. It includes the development of informal communities, authoritative frameworks and helpful asset conduct. Significance, separation, or centrality of individual sources compose measurements might be processed.

8. Conclusion and Future work:

If process mining is the equivalent of a GPS system, then this paper is only a large scale map for AIS researchers into a methodology whose promise has prompted an ambitious research agenda in other academic disciplines, as well as in industry. For process mining to become as widely adopted in AIS, accounting academics have to acknowledge that the proven value of process mining in those research areas indicates that it surely would be anomalous if it is not equally impactful in our own.

What are the kinds of problems in accounting that process mining can provide fresh insights into? While processes are important in several areas of accounting, particularly in management accounting, the focus of the extant process mining literature in accounting by Jans et al (2010) and Gehrke and Mueller-Wickop (2010) has been on auditing. That is not surprising because an essential aspect of auditing is the identification and examination of anomalous transactions. As Statement of Auditing Standards Number 56 states "A basic premise underlying the application of analytical procedures is that plausible relationships among data may reasonably be expected to exist and continue in the absence of known conditions to the contrary. Particular conditions that can cause variations in these relationships include, for example, specific unusual transactions or events, accounting changes, business changes, random fluctuations, or misstatements." (AICPA, 1988).

Process mining gives auditors a brand new and powerful device to perform analytic processes. Researchers have explored many one-of-a-kind analytic process tools, starting from easy ratio analysis to continuity equations and cluster evaluation (Hirst and Koonce, 1996; Kogan et al, 2010; Thirungsri, 2010). Procedure mining does no longer replace these strategies, but as a substitute, potentially presents manner of refining their outcomes. one of the important issues with any analytic processes technique is the number of false positives, precipitated now not with the aid of cloth anomalous transactions, however rather, as SAS 56 states, through routine commercial enterprise changes or random fluctuations. One feasible manner of setting apart the audit relevant from the immaterial is to observe the situations which gave upward push to transactions flagged as probably suspicious.

Another application of process mining to help refine the results of transactional analytic procedures arises in the work undertaken by Thirungsri (2010) to apply the statistical technique of cluster analysis to auditing. Again, the intention with that work is to follow the spirit of SAS 56 by developing new methods of identifying outliers in transactional data, but as with all such techniques the issue is separating suspicious outliers from merely unusual ones. Applying process mining to the entirety of a firm's data warehouse may be prohibitively costly and difficult to do in a timely fashion, but once a cluster is identified, which by definition is small and anomalous, then process mining can be applied to the event logs of just those transactions to see what the commonalities are that made them cluster together

Process mining can also be used by itself to better understand and set benchmarks for processes and when linked to a continuous monitoring system, to intervene in the system when ongoing processes deviate materially from those benchmarks. Such conformance testing is the most fundamental use of process mining, and it will take much research to develop it to the extent that it can be used in real time, which is where it can have the most impact on process efficiency. Such uses of process mining blurs the distinction between it and business process management, which also suggests that its main user might be internal auditors or managements as opposed to external auditors, who for independence reasons, would not want to intervene in business processes that they subsequently have to audit.

In future directives many applications of process mining can be practically, accounting are highly preliminary, since it is only by a sustained research effort that the full potential of process mining can be established. At this stage the promise of process mining is itself an open research question. Is there really any value in the data stored in event logs? Can the integrity of the meta-information be assured? Is the distinction between data mining and process mining mere semantics or is there a fundamental difference between them? And is that difference due solely to the use of the event log as a data source in process mining, or does the methods of data analysis also fundamentally differ, for example, because process mining allows very different questions to be asked and answered? Only once AIS researchers have tackled these and other open research questions will the value added of process mining as a new methodology for AIS researchers become fully understood.

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