



FUZZY ASSOCIATIVE CLASSIFIER FOR BIG DATA APPLICATIONS

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Abstract - The related blueprint field melds really intriguing cycles for building solid classifiers and any of those methodologies all issues mulled over works of art on 4 top-notch levels. The thought process of this work might be a novel developmental issue for profitably gathering helpful classifiers in huge information. Comfortable supportive hoarding has not been significantly examined inside the structure, anyway familiar classifiers have wrapped up being impeccable in particular genuine space programs. we advance a helpful pivoted delicate auxiliary depiction strategy subject to the Map decrease viewpoint. The framework mishandles a particularly appropriated discretize dependent on woolen entropy for productively making padded bundles of the attributes. Zeroing in on precision, rendition multifaceted nature, assessment time, and adaptability. We spotlight that, despite the way that the correctnesses result to be comparative, the flightiness, assessed with perceive to a number of guidelines, of the classifiers made through the smooth appropriated approach is not exactly the one among the non fuzzy classifiers. the total circuit of padded understanding grams to visual assessment of agreeable association manages a successful appropriated woolen familiar classification model-dependent at the Map diminish demeanor. The preparation assessment first mines an unprecedented arrangement of agreeable association classification directs by utilizing the utilization of a dispersed variant of a smooth development of the putting FP-development tally number. We show the adaptability of our strategy by means of doing selective examinations on an appropriate critical dataset. A fuzzy affiliation rule-based solicitation gadget for high-dimensional issues trouble to two or three territories to advantage a specific and inconsequential delicate standard based absolutely classifier with an espresso computational expense.

Keywords: Associative classification, Scalability, Fuzzy classifier, Mapreduce.



1. INTRODUCTION

This trouble has animated past due re-search makes a strength of gigantic realities, which merges a lot of strategies to appear into inconveniences got from the association and test of enormous proportions of measurements. In records assessment, two incredible obligations are thought of: explaining attempts, which portray trademark and enormous habitations of insights; and discerning duties, which accept yield factors for shrouded data by means of going to know organizing among an intriguing arrangement of records factors and in this manner the yield variable.

Cooling assessments all issues thought-about include 4 levels. 2d, the heavenly qualities are joined together and portrayed by utilizing event respect past a given breaking factor. 0.33, union arrangements are created from the strategy of reformist credit as of late got. In the long run, strategies are found and blessings dealt with on securing an exact classifier. In any case, these restrictive levels, particularly while running on enormous records, convinced unfeasible to be gone through present systems notwithstanding, while bleeding edge strategies in scattered enlisting are thought of. Notwithstanding, in any case, for a declining amount of levels, the computational multifaceted format in gigantic records is up to this point a handicap since it exponentially increments with the number of factors.

Recognizable classifiers had been all around investigated inside the bleeding edge years and mishandled in particular feasible certifiable projects [1], [2]. Clearly, the AC execution truly relies on the discretization cycle. In old design activities close, the discretization cycle parts the most straightforward district into elite stretches, naturally letting us gracefully out each mathematical rousing power to the choice of the general assortment it's a specialty with. to all or any the almost sure form clean advances among close by stages [3], the get-together of comfortable subsets has been beginning late proposed, on this way affecting smooth helpful classifiers (FACs) [4]-[6].

The affiliation mines depiction partnership rules (autos) with the assistance of the utilization of a surely redesigned, spread rendition of the striking FP-development assessment. The got vehicle set is then blurred through systems for a dispersed rule pruning technique, to the inclination to the quality base unquestionably utilized for a depiction of unlabeled models. Inside the essential area, straightforward far and wide bases are at the indistinguishable time made out of each rectangular of the plan set apart in selective focus factors. While building genuine classifiers, a decent extent of strategies was proposed recorded as an irksome duplicate, as an occurrence, those trouble to rules [7], choice lumber, or sponsorship vector machine to post a couple. What's extra, the principles passed on in AC are immediate, and that they even could likewise be earnestly animated through the top benefactor, in situ of neural affiliation and probabilistic procedures, which produce depiction styles which might be hard to understand [8].

Fuzzy affiliation guidelines [9] grant the vital of conditions among things in datasets. that they had been suitably applied to a gigantic total of issues [10], as an example, floor-breaking fuzzy joined forces diversion plan [11], mining of clinical realities puts together, etc. Horrifyingly, structures secured therefore remoted comfortable association guidelines are once during some time as interpretable as required [11]. The age of a helpful classifier is typically acted in two phases. Beginning, a lot of classification affiliation rules (autos) is mined from the plan set. Regardless of how auxiliary classifiers are commonly "interpretable" with the assistance of the client and affirmation high exactness in plan classification, these designs appreciate the underhanded effects of two key inadequacies.



Notwithstanding, association rule mining checks supervise twofold or outright issue sets.

At an equal time as managing FACs the other drawback happens: utilizing agreeable sections makes the delicate vehicle mining measure more flighty. The approaches proposed up to this point inside the arrangement for making agreeable collusion guidelines have bound the multifaceted nature through considering least difficult the most extreme predictable fluffy issue for every assets [12], [13], hence accomplishing an alright deal between the amount of affiliation rules and accordingly the extent of information depicted with the assistance of these principles.

To surpass the interpretability of the obtained demand rules and to keep away from unnatural cutoff factors inside the administering of the qualities, one among a sort assessments are familiar with get gathering structures dependent on delicate association arrangements [14]-[19]. As an outcome, this strategy should be utilized for little issues considering its computational cost is extraordinarily inordinate while we contemplate issues that incorporate a high kind of models or potentially components.

In this work, we utilize the most extreme brilliant one, the effortless sureness well worth or compatibility Factor (CF). Have separated the presentation of our machine and unprecedented ways to deal with control get padded familiar classifiers. Through at that point, we've displayed an assessment in mellow of the significance of the brambles and hence the amount of evaluations inside the inborn assurance and tuning degree. Inside the end, we've investigated the intensity of the proposed strategy.

2. RELATED WORK

2.1. Fuzzy Association Rules

Association rules uncover and represent dependencies among items in a dataset [20]. These are represented like $X \rightarrow Y$, where X and Y are item sets and $X \cap Y = \emptyset$. We'd prefer to comprehend them like X shows up during a pattern is particularly sensible that Y shows up there as appropriately. As an occurrence, in-market field appraisal the alliance $\{\text{computer, keyboard, screen}\} \rightarrow \{\text{mouse}\}$ calls attention to that once you purchase a PC, assistance, and a presentation you besides may include a mouse.

Anyway different works inside the universe of association strategies spin round discrete or twofold datasets, quantitative datasets developed to get out as impressively enthralling because of its appearance in clear bundles. In this manner, fuzzy set guidelines considered a beneficial way of movement to influence affiliations. It dodges unnatural cutoff focuses inside the distributing improves phonetic interpretability of the needs. Fuzzy set theory has been utilized consistently more prominent a striking an aspect of the time in information preparing because of its straightforwardness and similitude to human thinking. the use of woolen units to painting association among data broadens such affiliations which will be tended to, stimulates the translation of guidelines in semantic terms, and sidesteps unnatural cutoff focuses inside the designating of the things zones. thusly, beginning late unmistakable assessments have proposed strategies for mining fuzzy coalition rules from quantitative insights.

These measures could likewise be portrayed for fuzzy affiliation controls as keeps up: Fuzzy coalition rule extraction for demand: A pursuit tree is utilized to list all the plausible elegant fuzzy angle sets and to give smooth association rules to gathering. Up-and-comer rule prescreening: a tasteful evaluation rendition is utilized to preselect up-and-comer woolen affiliation rules. Acquired standard guarantee and same tuning: the least complex strong arrangements are picked and tuned by methods for procedures for a

GA, considering the top quality joint endeavor between the 2 techniques inside a relative cycle.

2.2. Fuzzy association rule extraction for classification

To make the RB we utilize a pastime tree to list all the reasonable padded factor units of a class . The motivation or stage zero of a pursuit tree is a vacant set. All credits are related to have a sales (for our condition, the sales for look inside the game plan data), and accordingly the main component sets standing out from the highlights are recorded inside the fundamental degree of the pursuit tree keep with their sales. On the off chance that a possessions has perhaps results

$$Support(R) = \frac{\sum_{x_p \in D} \mu_R(x_p)}{|D|}$$

$$Confidence(R) = \frac{\sum_{x_p \in D} \mu_R(x_p)}{\sum_{x_p \in D} \mu_X(x_p)}$$

where $|D|$ is the number of transactions in T , $\mu_R(x_p)$ is the matching degree of the transaction x_p with the antecedent part of the rule and $\mu_X(x_p)$ is the matching degree of the transaction x_p with the antecedent and consequent of the rule.

2.3. Associative classification

The assignment of pleasing solicitation (AC) was proposed as a blend of brilliant undertakings inside the realities mining fields, particularly connection rule mining and hoarding, as a path for building an interpretable and cautious classifiers . In such manner, this part definitively depicts those two undeniable undertakings and, therefore, it officially blessing the AC issue.

Let us first introduce association rule mining (ARM) in a formal way by considering a dataset comprising a set of transactions $T = \{t_1, t_2, \dots, t_m\}$ and a set of items or features $I = \{i_1, i_2, \dots, i_n\}$. Here, each transaction t_j comprises a subset of items $\{i_k, \dots, i_l\}$, $1 \leq k, 1 \leq n$. An association rule is formally defined [21] as an implication of the form $X \rightarrow Y$ where $X \subset I$, $Y \subset I$, and $X \cap Y = \emptyset$. The meaning of an association rule is that if the antecedent X is satisfied for a specific transaction t_j , i.e. $X \subset t_j$, then it is highly probable that the consequent Y is also satisfied for that transaction, i.e. $Y \subset t_j$. The frequency of an item set $X \subset I$, denoted as $support(X)$, is defined as the number of transactions from T that satisfies $X \subset t_j$, i.e. $|\{t_j \in T : X \subseteq t_j; t_j \subseteq I\}|$. In the same way, the support of an association rule $X \rightarrow Y$ is defined as the number of transactions from T that satisfies both X and Y , i.e. $|\{t_j \in T : X \subset t_j, Y \subset t_j; t_j \subseteq I\}|$.

Spend significant time in making sure about such a classifiers a decent extent of structures had been proposed, and the vast majority of them get coalition arrangements through strategies for thorough solicitation algorithms. CBA and its improved model CBA2 are events of AC algorithms that first mine association rules by methods for strategies for sizable solicitation checks.

2.4. Fuzzy Associative Classifiers

Affiliation guidelines portray associations among issue units, i.e., units of things in the midst of a dataset. They're passed on inside the structure $Z \rightarrow Y$, where Z and Y are

component sets and Z Y. Partnership rules had been widely used in commercial center box assessment, during which things get things and rules depict circumstances among them.

3. METHODOLOGY

We painting the appropriated FAC dependent on a FPP mining assessment. With acknowledge to the decently starter change introduced during an occasion paper, straightforwardly made by method of strategies for the proposed delicate confining issue. the general cycle comprises of seven Map Reduce reaches and 4 yields of the plan set. For clearness, we infer its utilization on Hadoop. To C_l and L is that the completed amount of modernity marks. despite the way that the classifier accuracy. This time of the proposed picking up information on degree offers a colossal movement in arriving at splendid results.

Here, we blessing a totally exceptional controlled padded dispensing calculation during solid 3-sided fluffy conveyances on every steady brand name: it recursively picks the focal point of every three-sided FS by means of choosing the competitor warm bundles that yield the immaterial delicate entropy, and a couple of time later parts the reliable property region into two subsets. somewhat like the strategy proposed by Fayyad and Iran, the cycle is rehashed for each presented subset till a halting situation is met. We review that the proposed way of reasoning is surely not a simple confine tuning measure. Totally, a tuning cycle is normally performed after the undeniable proof of an essential rate arrangement of cutoff points.

In this component the two thought are totally depicted. despite how the assessments are run on each Spark and Flink, the explanation is in like way on the grounds that the mentality is that the equivalent and in this manner the incredibly great distinction is that the stage. Through at that point, inside the take a look at degree, those idea were separated from current AC techniques to control show that both are the premier enchanting ones. The exploratory set-up is besides unquestionably depicted on this component close by which checks are done.

➤ **Aim of this work**

The objective of this work is to prompt obvious structures subject to standard figurings for AC, that is, CBA and CPAR, through developing ideal models of streamed overseeing. CBA is mulled over in light of the fact that the figuring that get the preeminent interpretable classifiers, anyway CPAR can comfortable exact classifiers with precision respects, in common, extra imperative than those got by utilizing CBA . during this work, the two proposed strategies were drawn nearer to each Apache Spark and Apache Flink, and these stages are picked thinking about that they are the principal proficient inside the enormous data subject.

➤ **CBA-Spark/Flink**

This exhortation depends upon the famous CBA be tallied, which utilizes indisputable stages. Quickly off the bat, the Apriori calculation is utilized to get connection rules. Similarly, a particular classifier is gathered the use of the as of late mined norms.

Zeroing in on empowering the understanding of the equal procedure, the natural be checked is immediately portrayed through a rendition. Inside the essential region, affiliation approaches are disposed of through strategies for the Apriori check number, for all intents and purposes agonizing about those necessities having a help and a conviction respects superior to a cutoff. In such way, the rest of the improvement inside the tally is

to murder those prerequisites with an espresso level of need and not concealing at any charge one rendition at the plan dataset.

The objective of this level is to comfortable those ideas whose rehash of event is greater incredible than a skirt of breakdown respect predefined by means of the buyer. On this experience, an iterative figuring trouble to the hanging Apriori is idea of. an intriguing difficulty of such a procedures is that the uncommonly high huge assortment of finishes up which will be passed on at the indistinguishable time. To influence this issue, a substitute isn't to shape the whole structure for each exchange beside the l-sized sub-move region on each event, requiring a predefined number of cycles. In such manner, both the memory necessities and in this way the computational time could likewise be dwindled.

This proposal is predicated upon the amazing CPAR be tallied, which in like way works in two specific levels. Toward the beginning , a voracious methodology is thought about inside the stylish age stage, which is basically more prominent proficient than making all applicant strategies. Also, CPAR extra than when looks for the ebb and go with the stream quality principle and takes the entirety of the records realities made certain roughly by means of the standard till there's no revealed records document. we've utilized these 3 prospects of couldn't considerations considerably less in each dataset and have affirmed up inside the tables the wonderful normal result got for each one.

Rule Selection.

On this following level, the examination cycle is that the standard strategy to be parallelized. The Map structure gets two sections as realities: a subset of the dataset, and in this manner the overall people. A get-by and large of units key, respect is made by methods for each mapper, during which the key's a comparable old set, and hence the cost might be a tuple with the precision respects keep with class. It will potentially observe the total precision respects reliable with grandness. Beginning there in advance, the prosperity work is settled. The yield of the reducer is that the assessed populace considering the entire dataset.

Module requirements

The blue node factors in built-up requests make delicate partnership rules, while the generous concealed ones make some separation Fin grams. The convey offered inside the lessening edge of the figure shows the potential results Fingram module gives. All things considered, a begin recall message turns up when the first utilization of the module.

We are prepared to recognize essentially related recommendations. Note that related norms spread pieces of the realities space in like manner and a relationship of induces that two rules are securing accurately a similar diversion plan of exercises. any more, the standards set aside inside the ruby oval have a higher guide and lower raise than those inside the blue one.

We utilized a considering assessment that disengages both selection limits (MFs) and delicate alliance rules for the given dataset. It handles quantitative attributes by methods for systems for an acquired learning of the MFs trouble to the tuples semantic portrayal form and in this manner the use of a fundamental technique for mining padded association arrangements.



4. RESULT AND DISCUSSION

Scalability Analysis

DFAC-FFP is portrayed in its capability to manhandle various pivoted managing offices, by methods for studying its stage adaptability. Such a test is depended upon to gauge how the proposed technique can manhandle a social event of item equipment. The assessment is predicated on the impact of the use of q verifiable CUs on standard runtimes. On a fundamental stage, such CUs can have a particular portion with restrictive center focuses, or are frequently resolved to the similar center factor of a social event of computers.

Table 1. The Overall Algorithm for Dataset

Q(#CUs)	Time(s)	Speedup	σ_s (Utilizaion)
9	62.325	9	1.00
18	33.467	16.675	0.974
27	21.784	23.543	0.843
36	18.586	31.018	0.821

All things considered, the equipment assets at each center are regularly maintained up inside the task to strengthen the general runtime. it's been demonstrated that vertical flexibility doesn't tend a key component concerning levels for gigantic data assessment. Amazingly, in flexibility assessment, the presence of hyper-setting are regularly through and huge accounted by utilizing CU based results. The extent of predictable with-center memory impacts the significant figuring value. We basically expect that each middle point has great memory territory to help the open execution.

An interesting runtime portrayal could likewise be inescapable to spot out probably bottlenecks. In the end, we look at moreover how the unique levels impact the general approach. The high measure wont to check adaptability is that the regular speedup record σ , which separates the runtime of the equivalent execution to the concerning lower back to again shape. Running with gigantic surveyed datasets, precisely the stylish change puts separated an extremely long effort to be finished.

An unmatched idea of the flexibility shows includes a more gigantic data at the commitments from the real Map diminish occupations. We report the speedup σ eight of the padded dispensing and hence the four most dreary conditions, exceptionally dissipated fluffy parceling, appropriated agreeable FP-blast, flowed pruning dependent on delicate supp and conf, and surpassed on preparing set consolidation pruning. the necessity of the contrary two levels (dissipated woolen checking and up-and-comer rule segregating) is irrelevant.

The overall result is commonly controlled with the assistance of the runtime of the last reduce step of the spread delicate isolating. to shape certain, the degree of parallelism is controlled with the assistance of the quantity of unending credit that basically appreciate discretization. The outcome comprises that, as respects the float of the computational development of the abatement stage, no authentic favored job begins from the utilization of more noteworthy than 18 core interests. Of course, the overall execution length of the manual levels is regularly certainly withered through manhandling a correct amount of core interests. Further runtime redesigns are maybe won by the method of reiterating, for this degree, to bundle figuring structures that higher assistance iterative calculations.



With these attributes for our recommendation, we have tried to engage associations, picking standard typical limits that business extraordinarily a far and wide an area of the time as opposed to endeavoring to search out exceptionally certain characteristics. Inside the KEEL programming device. Further, inside the CFAR calculating the makers utilized 0.1 in light of the fact that the base assistance and this might be exorbitant for several datasets. Basically, we have utilized these two least sponsorships in each dataset (0.1 and 0.05) and that we have affirmed up inside the tables the top of the line customary outcome got in all.

4.1. Discussion

The explanation of this part is to investigate all the presently referred to assessments as built up through three rule measures: farsighted vitality, interpretability, and ampleness. The comment that the fine calculations for each reason are the fundamental ones used in the underlying assessment of the going with the rule. Those three assessments are done from two elective perspectives: customary calculations and datasets. At last, the perception that standard ways of thinking can't be run on colossal records datasets.

Classical state-of-art

Disconnecting the precision, it is gotten that CMAR and One R got the first really unpleasant outcomes. This lead is finished by utilizing the way that One R just uses an interesting in vogue to expect regular datasets. It should be seen that in those datasets containing an unfathomable kind of events, and obviously better scope of rules is relied upon to cowl the entirety of the designs. But, CMAR didn't get incredibly great impacts since it improvements the sureness degree in withdrawal, that is, it makes basic classifiers that can't unequivocally imagine unpretentious models.

At last, it's miles generally indispensable to bring up the making of our idea while immense records are eviscerated. In such a way, the idea is stood apart from AC assessments for gigantic data on a movement of datasets of high dimensionality. The underlying outcomes considering the Friedman take a look at uncovered.

Results hint that our suggestion plays irrefutably above DAC and DFAC-FFP in suitability. Consequently, it's demonstrated the promising behavior of our recommendation while it is applied to genuinely enormous data. recollect that solitary the guidelines with elite trailblazer circumstances not truly or corresponding to two or three are explored for our proposal. This deterrent is depended upon to enable the exposure of relatively few snappy padded guidelines. The limits of the remainder of the approaches are picked by utilizing the exhortation of the watching producers' internal every thought, which might be the default limitation settings ensured.

5. CONCLUSION

The rationale of the methodology is to shape diminished FACs with stand-out tradeoffs among exactness and multifaceted nature. Further, the MapReduce edge and in this way the gave on file shape formed inside the Hadoop structure outfit us to suitably parallelize the calculation flow across PC bundles by methods for giving a powerful and direct condition that oversees trades among them and plausible disappointments. we have proposed the other padded related gathering approach for over the top dimensional datasets. Our point is to encourage definite and dwindled padded gainful classifiers with an espresso computational worth. to attempt to that, we mine padded collusion rules

confining the sales for the reference to the aim to benefit a decreased arrangement of up-and-comer rules with considerably less credit inside the forerunner. An acquired principle confirmation and sidelong tuning is applied to choose somewhat sport plan of fluffy association guidelines with an unreasonable solicitation precision.

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