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A Survey on Fraud Ranking Detection in Mobile App

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ABSTRACT: Ranking fraud in the mobile App market used to find fraudulent or unwanted activities which have aim to bumping up the Apps which are in the popularity list. Indeed, it becomes more and more frequent for App developers to use cloudy means, such as inflating their Apps' sales or posting phony App ratings, to commit ranking fraud. While the importance of preventing ranking fraud has been widely recognized, there is limited understanding and research in this area. To this end, in this paper, we provide a view of ranking fraud and propose a ranking fraud detection system for mobile Apps.

KEYWORDS: Rank aggregation, Ranking fraud detection, Historical ranking records, Mobile App.

I. INTRODUCTION

The number of mobile apps is growing continuously from past few years, to take a look on most popular app these app are rank in the leaderboard. Leaderboard is very helpful to demonstrate the chard ranking of most popular app. Leaderboard is very best way to promote apps. Higher rank in the leaderboard causes million dollars in income.

To increase income the app designer investigates different roots to increase the publicity of app and catch the higher position in leaderboard. As a result for this, they not depends only on customers showcasing arrangement, the cloudy app engineer resort some fake in tends to intestinally help their app and in the end control the diagram rankings on an app store.

To increase the position of app on the leaderboard using unauthorized way it effects on reputation of app, but when app is developed by know or famous app developer then that app automatically become famous due to this other app get affected. To reduce this, three evidence are created ranking based evidence, rating based evidence and review based evidence. These evidence are helpful to keep the position of app on right place, but there are some fraud are happen in ranking, ranting and review also to detect this fraud ranking fraud detection system is created.

This fraud is happen in leading session, this leading session is the session when app reach to the peak point and maintain their position in time the app at what point it situated that point is leading event of that app. Fraud is happen in that leading session this fraud detection system is useful to detect fraud in that leading session. To detect fraud in leading session algorithm is provided and also to detect the leaving event of app leading event algorithm is also provided. By mining these two algorithms mining algorithm is provided to detect leading session and leading event at the same time.

By detecting this fraud we easily know which app having fraud ranking on leaderboard and it help to keep the perfect position of app on leaderboard. By using this system people can make right choice of app.

In the related work, it consists of similar paper which is related to finding fraud in mobile app. In each paper evidence are created to detect the ranking fraud, by taking the reference of these paper evidence are created to detect the ranking fraud in mobile app.



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II. RELATED WORK

Hengshu Zhu et al. [1] provides ranking fraud detection system for mobile Apps which accurately locate the ranking fraud by mining the active periods, such as leading sessions, of mobile Apps. This paper identified three types of evidences i.e. ranking based evidences, rating based evidences and review based evidences for detecting ranking fraud. Hengshu Zhu also proposes an optimization based aggregation method for integrating all the evidences for fraud detection.

Yong Ge et al. [2] have studied about taxi driving fraud detection system Which provides two functions to find evidences one is travel route evidence and second one is driving distance evidence. For discovering the travel route evidence, trajectories are encoded using symbols and oversampling. Driving path from one interesting site to another one is discovered using route mark and then statistically modeled the driving distance with the help of identified route marks.

Kevin Small et al. [3] proposed aggregate (partial) rankings without supervision which uses distance based model. Heuristic and supervised learning approaches are also used for rank aggregation but they require domain knowledge or supervised ranked data, both of which are expensive to acquire. These problems are addressed by distance based ranking model.

AlexandreKlementiev et al. [4] describes unsupervised learning algorithm for rank aggregation. This method solves rank aggregation problem by specifying an optimization problem to learn a linear combination of ranking functions. This makes the assumptions and allowing us to assign a high weight to rankers that tend to agree with the expert pool and reduce the influence of those rankers which tend to disagree.

Maksims et al. [5] solves Meta search and collaborative filtering problems using flexible probabilistic model over pairwise comparisons, in which multiple preferences over objects must be combined into a consensus ranking.

Jeevanandam et al. [6] introduces Opinion mining using Learning Vector Quantization classifier. It is not efficient to manually handle the large amount of opinions which generated during online. To solve this Opinion mining uses automatic processes for extracting reviews. Inverse document frequency is used to extract features from review document and Principal Component Analysis is used for feature selection.

AlexandreKlementiev et al. [7] introduces unsupervised learning framework for rank aggregation over votes of rankers with domain specific expertise and also gives EM-based algorithm. This paper evaluates framework on aggregating full rankings and aggregating top-k lists that improves over a domain-agnostic baseline. This approach is used to solve many problems in Information Retrieval and Natural Language Processing such as meta-search or aggregation of machine translation systems.

H. Zhu, H. Xiong, Y. Ge et al. [8] introduces Optimization based aggregation method to integrate all evidences. In this validation is done with this system and some regularities of ranking fraud activities has been displayed. In this all evidences are modeled by hypothesis tests so that, it is easy to extend with other evidences to detect ranking fraud.

Spirin and J. Han et al. [9] introduces web spam phenomenon. In this, they perform sub-categorization of link based category in many groups. Those are: labels propagation, link pruning, labels refinement, graph regularization and feature based. In this paper, categorization is done with the existing algorithms. Those are: 1. Content Based Methods, 2. Link based methods, 3. Method based on the non-traditional data such as, user behavior.

III. METHODOLOGY

Ranking fraud in the mobile App market refers to fraudulent or deceptive activities which have a purpose of bumping up the Apps in the popularity list. Indeed, it becomes more and more frequent for App developers to use shady means, such as inflating their Apps' sales or posting phony App ratings, to commit ranking fraud. While the

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importance of preventing ranking fraud has been widely recognized, there is limited understanding and research in this area.

Detecting ranking fraud in mobile app is usually detecting ranking fraud in the session of app. So, first is to propose the algorithm to identify the session of that mobile app according to its historical ranking records and characterize some evidences based on those historical ranking records. There are two types of fraud evidences are app rating and review history [1]. There is another method which aggregates these evidences to evaluate the session from mobile app.

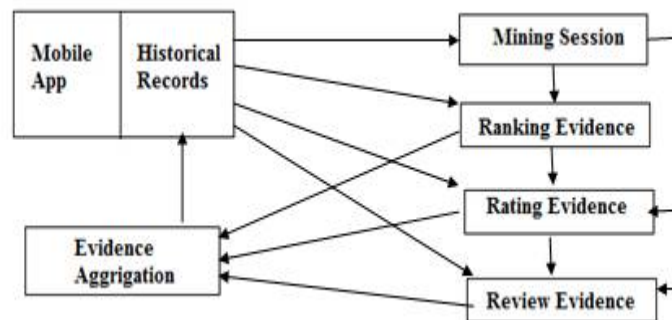


Fig 1. Framework for fraud detection System.

This framework is scalable and extended with other domain. In survey of fraud detection the problem is still under-explored. Some existing systems are not able to extract fraud evidences.

In Ranking Based Evidences, by analyzing the Apps' historical ranking records, Apps' ranking behaviors in a leading event always satisfy a specific ranking pattern, which consists of three different ranking phases, those are, rising phase, maintaining phase and recession phase.

In Rating Based Evidences, specifically, after an App has been published, it can be rated by any user who downloaded it. Indeed, user rating is one of the most important features of App advertisement. An App which has higher rating may attract more users to download and can also be ranked higher in the leader board. Thus, rating manipulation is also an important perspective of ranking fraud.

In Review Based Evidences, besides ratings, most of the App stores also allow users to write some textual comments as App reviews. Such reviews can reflect the personal perceptions and usage experiences of existing users for particular mobile Apps. Indeed, review manipulation is one of the most important perspectives of App ranking fraud.

With the study of ranking behavior of App, fraudulent App has different ranking patterns. In this, leading session is compared with the normal App. So that, some fraud evidences are characterized. All evidences are extracted by modeling App's ranking.

IV. CONCLUSION

Thus, many existing systems are developed for fraud detection in mobile app. Some existing systems are scalable but having some major issues and not able to find ranking fraud in App's historical leading session. So, it is necessary to characterize some fraud evidences App's historical records and develop function to extract ranking based fraud evidences.

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