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A Query Approach to Social Influence Maximization

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Abstract: Influence maximization is introduced to maximize the profit of viral marketing in social networks. Impact amplification is used to augment the benefit of viral promoting in informal organizations. The shortcoming of impact expansion is that it doesn't recognize particular clients from others, regardless of the possibility that a few things can be helpful for the particular clients. For such things, it is a superior system to concentrate on boosting the impact on the particular clients. In this paper, we detail an impact boost issue as question handling to recognize particular clients from others. We formulate an influence maximization problem as query processing to distinguish specific users from others. We show that the query processing problem is NP-hard and its objective function is submodular. We propose an expectation model for the value of the objective function and a fast greedy-based approximation method using the expectation model. For the expectation model, we investigate a relationship of paths between users. For the greedy method, we work out an efficient incremental updating of the marginal gain to our objective function. We propose a desire model for the estimation of the target capacity and a quick covetous based close estimation strategy utilizing the desire model. For the desire model, we explore a relationship of ways between clients. For the covetous technique, we work out a productive incremental overhauling of the negligible addition to our goal capacity. We lead trials to assess the proposed technique with genuine datasets, and contrast the outcomes and those of existing systems that are adjusted to the issue. From our trial results, the proposed strategy is no less than a request of extent speedier than the existing routines by and large while accomplishing high exactness.

Keywords: Graph algorithms, influence maximization, independent cascade model, social networks.

I. INTRODUCTION

As of late, the measure of spread of data is relentlessly expanded in online interpersonal organizations, for example, Facebook and Twitter. To utilize online interpersonal organizations as a promoting stage, there are loads of examination on the best way to utilize the proliferation of impact for viral advertising. One of the exploration issues is influence maximization (IMAX), which plans to discover k seed clients to amplify the spread of impact among clients in interpersonal organizations. Viral showcasing is one of the key utilizations of impact boost. In viral advertising, a thing that an advertiser needs to advance is diffused into informal communities "by overhearing people's conversations" correspondence. From the point of view of advertising, impact augmentation gives how to get the most extreme benefit from every one of the clients in an informal organization through viral showcasing. In any case, impact amplification is not generally the best technique for viral showcasing, on the grounds that there can be a few things that are helpful to just particular clients. These particular clients can be a couple individuals with a typical enthusiasm for a given thing, some or all individuals in a group, or some or all clients in a class. There is no restriction for being particular clients. For instance, consider an advertiser that is approached to advance a restorative item for ladies through viral showcasing. For the corrective item, the particular clients are female clients why should likely utilize it and male clients who wish to buy it as a present for female clients. For this situation, the advertiser does not should be worried about alternate clients in light of the fact that the restorative item is not helpful to them. Rather, it is a superior method to concentrate on augmenting the quantity of impacted particular clients, yet impact amplification has the shortcoming that it can't recognize them from alternate clients. The main method for taking care of such focuses with impact boost is making a homogeneous diagram with the objectives and executing impact expansion on the chart. On the other hand, the aftereffect of this methodology ought to be off base, on the grounds that there can be a few clients who are not targets but rather can unequivocally impact the objectives.

II. EXISTING SYSTEM

Viral marketing is one of the key applications of influence maximization. In viral marketing, an item that a marketer wants to promote is diffused into social networks by "word-of-mouth" communication.

From the perspective of marketing, influence maximization provides how to get the maximum profit from all the users in a social network through viral marketing. However, influence maximization is not always the most effective strategy for viral marketing, because there can be some items that are useful to only specific users. These specific users can be a few people with a common interest in a given item, some or all people in a community, or some or all users in a class. There is no limit for being specific users.

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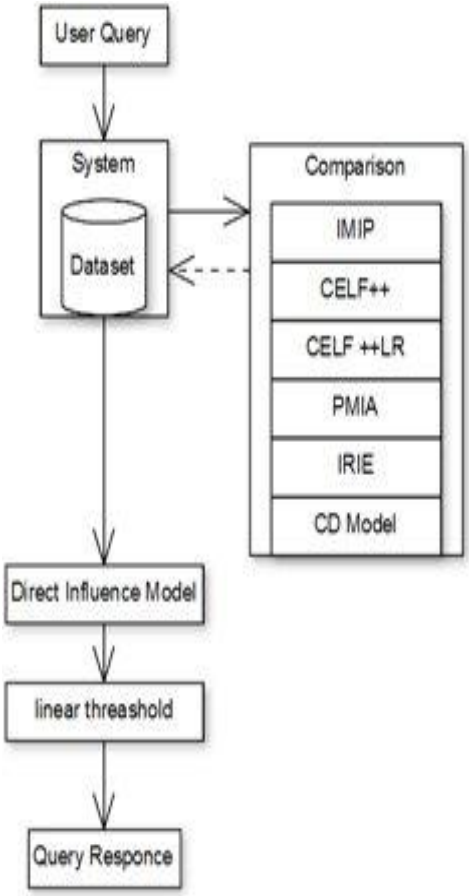
DISADVANTAGES OF EXISTING SYSTEM: It does not distinguish specific users from others, even if some items can be only useful for the specific users.

III. PROPOSED SYSTEM

We propose a new efficient expectation model for influence spread of a seed set. We show that the new objective function of the expectation model is Sub modular. Based on the new expectation model, we propose a greedy-based approximation method to process an IMAX query with efficient incremental updating of the marginal gain of each user. We also propose an effective method to reduce the number of candidates for optimal seeds by identifying users who strongly influence targets from preprocessed data.

ADVANTAGES:
Maximizing the influence on the specific users. It can easily distinguish specific users from others.

System Architecture



Mathematical model of proposed system
Let S is the Whole System Consist of
S= {I, P, O}
I = Input.
I = {U, Q, D}
U = User
U = {u1,u2….un}
Q = Query Entered by user
Q = {q1, q2, q3…qn}
D = Dataset.
P = Process:
P = {IMIP, CELF, PMIA, IRIE, CD Model}
IMIP: independent maximum influence paths
CELF: Cost-Effective Lazy Forward
PMIA: prefix excluding maximum influence arborescence

Step1: User enters the Query.
Step2: In comparison process following methods will be performed.
Step3: Independent maximum influence paths (**IMIP**):We propose a new efficient expectation model for the influence spread of a seed set based on independent maximum influence paths (IMIP) among users.
Step4: CELF++: is an improved greedy algorithm exploiting Sub-modularity.
Step5:PMIA is a greedy-based algorithm based on maximum influence paths between nodes. In PMIA, parameter u is used to prune out maximum influence paths having low influence.
Step6:IRIE: is one of recent algorithms for influence maximization.
Step7:CD Model:CD is the greedy method using the CD model. The CD model is a probabilistic model based on users' historical action logs. We use this method only for the experiment related to the actual influence spread.

Output: Finally, the particular result will be shown to user as per his query.

Algorithms of Proposed system
Greedy Algorithm: (G = (V,E),k,T)
input: G: An input graph, k:size of a seed set, T:aset of targets
output: S: Output seed set
1: begin
2: S = Ø
3: for i=1 to k do
4: $s = \arg\max_{v \in V}(\sigma_T(S \cup \{v\}) - \sigma_T(S));$
5: S = S ∪{s}
6: return S;

Project Perception & Study
Problem modelling :
Impact boost is acquainted with augment the benefit of viral promoting in social at works. The shortcoming of impact boost is that it doesn't recognize particular clients from others, regardless of the possibility that a few things can be valuable for the particular clients. For such things, it is a superior technique to concentrate on boosting the impact on the particular clients.

Problem design using set theory P:
Influence maximization is introduced to maximize the profit of viral marketing in social Networks. The weakness of influence maximization is that it does not distinguish specific users from others, even if some items can be only useful for the specific users. For such items, it is a better

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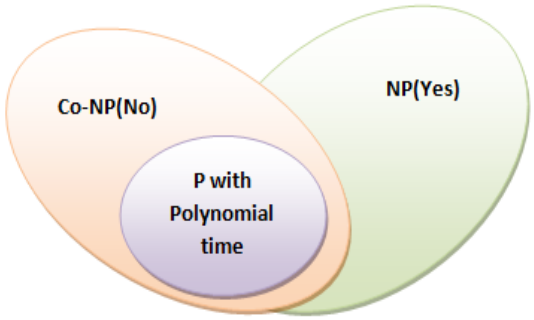
strategy to focus on maximizing the influence on the specific users.



NP-Hard analysis
What is P?

- P is set of all decision problems which can be solved in polynomial time by a deterministic.
- Since it can be solved in polynomial time, it can be verified in polynomial time.
- Therefore P is a subset of NP.

What is NP?

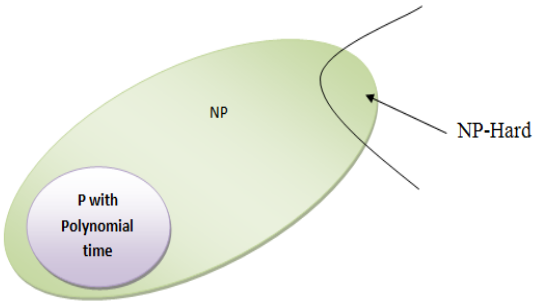
- "NP" means "we can solve it in polynomial time if we can break the normal rules of step-by-step computing".

What is NP Hard?

A problem is NP-hard if an algorithm for solving it can be translated into one for solving any NP-problem (nondeterministic polynomial time) problem. NP-hard therefore means "at least as hard as any NP-problem," although it might, in fact, be harder.

Np-Hard:

We formulate an impact expansion issue as inquiry handling to recognize particular clients from others. We demonstrate that the question preparing issue is NP-hard and its target capacity is sub modular. We propose a desire model for the estimation of the target capacity and a quick ravenous based guess strategy utilizing the desire model. For the desire model, we examine a relationship of ways between clients.

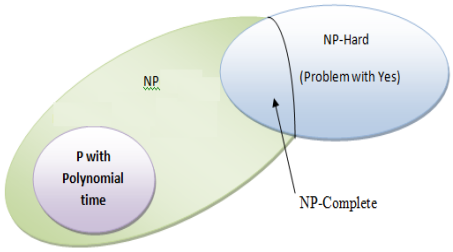


What is NP-Complete?

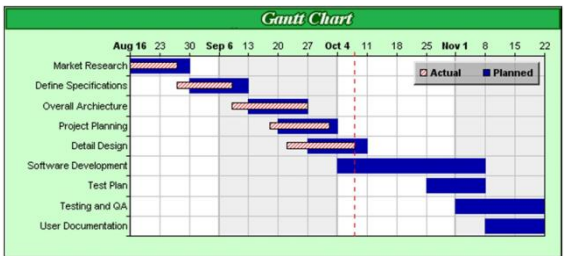
- Since this amazing "N" computer can also do anything a normal computer can, we know that "P" problems are also in "NP".
- So, the easy problems are in "P" (and "NP"), but the really hard ones are *only* in "NP", and they are called "NP-complete".
- It is like saying there are things that People can do ("P"), there are things that Super People can do ("SP"), and there are things *only* Super People can do ("SP-complete").

NP-Complete:

We figure IMAX question handling to amplify the impact on particular clients in interpersonal organizations. Since IMAX inquiry preparing is NP-hard and computing its target capacity is #P-hard, we concentrate on the most proficient method to surmised ideal seeds productively. To surmise the estimation of the goal capacity, we propose the IMIP model in view of autonomy between ways. To handle an IMAX inquiry effectively, extricating contender for ideal seeds is proposed also, the quick greedy-based estimate utilizing the IMIP model.



PERT chart/ Gantt chart
Gantt Chart/ Schedule.



Project Estimate

To estimate the target's estimation capacity, we propose the IMIP model in view of freedom between ways. To prepare an IMAX question proficiently, removing possibility for ideal seeds is proposed and the quick ravenous based estimate utilizing the IMIP model.

Implementation
User Interface:

The user interface should be designed in a way such that it will be easy to understand and easy to use. The user interface of application should be user friendly. The location will be displayed through Google map.

1. Login Form
2. Application On Off Form Settings Form

Software Interface:

1. Operating System: Windows7
2. Database: MySql 5.6
3. IDE : Eclipse

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NONFUNCTIONAL REQUIRMENTS

Performance Requirement :

- Every module of the system should work efficiently.
- The system should perform fast in all weather conditions.

Safety & Security Requirement :

- The java application will not affect other applications on user's system.

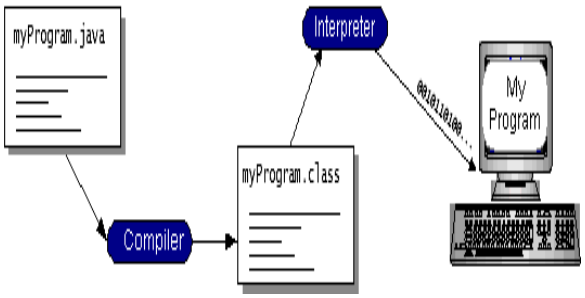
Java Technology

Java technology is both a programming language and a platform.

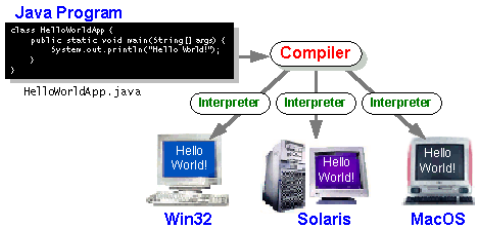
The Java programming language is a high-level language that can be characterized by all of the following buzzwords:

- Simple
- Architecture neutral
- Object oriented
- Portable
- Distributed
- High performance
- Interpreted
- Multithreaded
- Robust
- Dynamic
- Secure

With most programming languages, you either compile or interpret a program so that you can run it on your computer. The Java programming language is unusual in that a program is both compiled and interpreted. With the compiler, first you translate a program into an intermediate language called Java byte codes —the platform-independent codes interpreted by the interpreter on the Java platform. The interpreter parses and runs each Java byte code instruction on the computer. Compilation happens just once; interpretation occurs each time the program is executed. The following figure illustrates how this works.



You can think of Java byte codes as the machine code instructions for the Java Virtual Machine (Java VM). Every Java interpreter, whether it's a development tool or a Web browser that can run applets, is an implementation of the Java VM. Java byte codes help make "write once, run anywhere" possible. You can compile your program into byte codes on any platform that has a Java compiler. The byte codes can then be run on any implementation of the Java VM. That means that as long as a computer has a Java VM, the same program written in the Java programming language can run on Windows 2000, a Solaris workstation, or on an iMac.



ODBC

Microsoft Open Database Connectivity (ODBC) is a standard programming interface for application developers and database systems providers. Before ODBC became a de facto standard for Windows programs to interface with database systems, programmers had to use proprietary languages for each database they wanted to connect to. Now, ODBC has made the choice of the database system almost irrelevant from a coding perspective, which is as it should be. Application developers have much more important things to worry about than the syntax that is needed to port their program from one database to another when business needs suddenly change.

Through the ODBC Administrator in Control Panel, you can specify the particular database that is associated with a data source that an ODBC application program is written to use. Think of an ODBC data source as a door with a name on it. Each door will lead you to a particular database. For example, the data source named Sales Figures might be a SQL Server database, whereas the Accounts Payable data source could refer to an Access database. The physical database referred to by a data source can reside anywhere on the LAN.

The ODBC system files are not installed on your system by Windows 95. Rather, they are installed when you setup a separate database application, such as SQL Server Client or Visual Basic 4.0. When the ODBC icon is installed in Control Panel, it uses a file called ODBCINST.DLL. It is also possible to administer your ODBC data sources through a stand-alone program called ODBCADM.EXE. There is a 16-bit and a 32-bit version of this program and each maintains a separate list of ODBC data sources.

From a programming perspective, the beauty of ODBC is that the application can be written to use the same set of function calls to interface with any data source, regardless of the database vendor. The source code of the application doesn't change whether it talks to Oracle or SQL Server. We only mention these two as an example. There are ODBC drivers available for several dozen popular database systems. Even Excel spreadsheets and plain text files can be turned into data sources. The operating system uses the Registry information written by ODBC Administrator to determine which low-level ODBC

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drivers are needed to talk to the data source (such as the interface to Oracle or SQL Server). The loading of the ODBC drivers is transparent to the ODBC application program. In a client/server environment, the ODBC API even handles many of the network issues for the application programmer.

JDBC

In an effort to set an independent database standard API for Java; Sun Microsystems developed Java Database Connectivity, or JDBC. JDBC offers a generic SQL database access mechanism that provides a consistent interface to a variety of RDBMSs. This consistent interface is achieved through the use of "plug-in" database connectivity modules, or drivers. If a database vendor wishes to have JDBC support, he or she must provide the driver for each platform that the database and Java run on.
To gain a wider acceptance of JDBC, Sun based JDBC's framework on ODBC. As you discovered earlier in this chapter, ODBC has widespread support on a variety of platforms. Basing JDBC on ODBC will allow vendors to bring JDBC drivers to market much faster than developing a completely new connectivity solution. JDBC was announced in March of 1996. It was released for a 90 day public review that ended June 8, 1996. Because of user input, the final JDBC v1.0 specification was released soon after. The remainder of this section will cover enough information about JDBC for you to know what it is about and how to use it effectively. This is by no means a complete overview of JDBC. That would fill an entire book.

SQL Level API

The designers felt that their main goal was to define a SQL interface for Java. Although not the lowest database interface level possible, it is at a low enough level for higher-level tools and APIs to be created. Conversely, it is at a high enough level for application programmers to use it confidently. Attaining this goal allows for future tool vendors to "generate" JDBC code and to hide many of JDBC's complexities from the end user.

MySQL

MySQL, the most popular Open Source SQL database management system, is developed, distributed, and supported by Oracle Corporation.

The MySQL Web site (http://www.mysql.com/) provides the latest information about MySQL software.

- **MySQL is a database management system.**

A database is a structured collection of data. It may be anything from a simple shopping list to a picture gallery or the vast amounts of information in a corporate network. To add, access, and process data stored in a computer database, you need a database management system such as MySQL Server. Since computers are very good at handling large amountsof data, database management systems play a central role in computing, as standalone utilities, or as parts of other applications.

- **MySQL databases are relational.**

A relational database stores data in separate tables rather than putting all the data in one big storeroom. The database structures are organized into physical files optimized for speed. The logical model, with objects such as databases, tables, views, rows, and columns, offers a flexible programming environment. You set up rules governing the relationships between different data fields, such as one-to-one, one-to-many, unique, required or optional, and "pointers" between different tables. The database enforces these rules, so that with a well-designed database, your application never sees inconsistent, duplicate, orphan, out-of-date, or missing data.

The SQL part of "MySQL" stands for "Structured Query Language". SQL is the most common standardized language used to access databases. Depending on your programming environment, you might enter SQL directly (for example, to generate reports), embed SQL statements into code written in another language, or use a language-specific API that hides the SQL syntax.

SQL is defined by the ANSI/ISO SQL Standard. The SQL standard has been evolving since 1986 and several versions exist. In this manual, "SQL-92" refers to the standard released in 1992, "SQL:1999" refers to the standard released in 1999, and "SQL:2003" refers to the current version of the standard. We use the phrase "the SQL standard" to mean the current version of the SQL Standard at any time.

- **A large amount of contributed MySQL software is available.**

MySQL Server has a practical set of features developed in close cooperation with our users. It is very likely that your favorite application or language supports the MySQL Database Server. The official way to pronounce "MySQL" is "My Ess Que Ell" (not "my sequel"), but we do not mind if you pronounce it as "my sequel" or in some other localized way.

IV. LITERATURE SURVEY

1. Maximizing the spread of influence through a social network

AUTHORS:D. Kempe, J. Kleinberg, and E. Tardos Models for the processes by which ideas and influence propagate through a social network have been studied in a number of domains, including the diffusion of medical and technological innovations, the sudden and widespread adoption of various strategies in game-theoretic settings, and the effects of "word of mouth" in the promotion of new products. Recently, motivated by the design of viral marketing strategies, Domingos and Richardson posed a fundamental algorithmic problem for such social network processes: if we can try to convince a subset of individuals to adopt a new product or innovation, and the goal is to trigger a large cascade of further adoptions, which set of individuals should we target? We consider this problem in several of the most widely studied models in social

network analysis. The optimization problem of selecting the most influential nodes is NP-hard here, and we provide the first provable approximation guarantees for efficient algorithms. Using an analysis framework based on submodular functions, we show that a natural greedy strategy obtains a solution that is provably within 63% of optimal for several classes of models; our framework suggests a general approach for reasoning about the performance guarantees of algorithms for these types of influence problems in social networks. We also provide computational experiments on large collaboration networks, showing that in addition to their provable guarantees, our approximation algorithms significantly out-perform node-selection heuristics based on the well-studied notions of degree centrality and distance centrality from the field of social networks.

2.Profit maximization over social networks

AUTHORS: W. Lu and L. Lakshmanan

Influence maximization is the problem of finding a set of influential users in a social network such that the expected spread of influence under a certain propagation model is maximized. Much of the previous work has neglected the important distinction between social influence and actual product adoption. However, as recognized in the management science literature, an individual who gets influenced by social acquaintances may not necessarily adopt a product (or technology), due, e.g., to monetary concerns. In this work, we distinguish between influence and adoption by explicitly modeling the states of being influenced and of adopting a product. We extend the classical Linear Threshold (LT) model to incorporate prices and valuations, and factor them into users' decision-making process of adopting a product. We show that the expected profit function under our proposed model maintains sub modularity under certain conditions, but no longer exhibits monotonicity, unlike the expected influence spread function. To maximize the expected profit under our extended LT model, we employ an unbudgeted greedy framework to propose three profit maximization algorithms. The results of our detailed experimental study on three real-world datasets demonstrate that of the three algorithms, PAGE, which assigns prices dynamically based on the profit potential of each candidate seed, has the best performance both in the expected profit achieved and in running time.

3. Mining the network value of customers.

AUTHORS:P. Domingos and M. Richardson

One of the major applications of data mining is in helping companies determine which potential customers to market to. If the expected profit from a customer is greater than the cost of marketing to her, the marketing action for that customer is executed. So far, work in this area has considered only the intrinsic value of the customer (i.e, the expected profit from sales to her). We propose to model also the customer's network value: the expected profit from sales to other customers she may influence to buy, the customers those may influence, and so on recursively. Instead of viewing a market as a set of independent entities, we view it as a social network and model it as a Markov random field. We show the advantages of this approach using a social network mined from a collaborative filtering database. Marketing that exploits the network value of customers---also known as viral marketing---can be extremely effective, but is still a black art. Our work can be viewed as a step towards providing a more solid foundation for it, taking advantage of the availability of large relevant databases.

4. Cost-effective outbreak detection in networks

AUTHORS:J. Leskovec, A. Krause, C. Guestrin, C. Faloutsos, J. VanBriesen, and N. Glance. Given a water distribution network, where should we place sensors too quickly detect contaminants? Or, which blogs should we read to avoid missing important stories. These seemingly different problems share common structure: Outbreak detection can be modeled as selecting nodes (sensor locations, blogs) in a network, in order to detect the spreading of a virus or information asquickly as possible. We present a general methodology for near optimal sensor placement in these and related problems.

We demonstrate that many realistic outbreak detection objectives (e.g., detection likelihood, population affected) exhibit the property of "sub-modularity". We exploit sub-modularity to develop an efficient algorithm that scales to large problems, achieving near optimal placements, while being 700 times faster than a simple greedy algorithm. We also derive online bounds on the quality of the placements obtained by any algorithm. Our algorithms and bounds also handle cases where nodes (sensor locations, blogs) have different costs.

We evaluate our approach on several large real-world problems,including a model of a water distribution network from the EPA, andreal blog data. The obtained sensor placements are provably near optimal, providing a constant fraction of the optimal solution. We show that the approach scales, achieving speedups and savings in storage of several orders of magnitude. We also show how the approach leads to deeper insights in both applications, answering multi-criteria trade-off, cost-sensitivity and generalization questions.

V. CONCLUSION

In this paper, we detail IMAX question preparing to expand the impact on particular clients in informal organizations. Since IMAX inquiry handling is NP-hard and ascertaining its target capacity is #P-hard, we concentrate on the most proficient method to inexact ideal seeds effectively.

To estimate the target's estimation capacity, we propose the IMIP model in view of freedom between ways. To prepare an IMAX question proficiently, removing possibility for ideal seeds is proposed and the quick ravenous based estimate utilizing the IMIP model.

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