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A Survey on Road Accident Prediction Techniques Based on Various Methodologies

Sonam Singh, Shailesh Singh
Sheat College of Engineering, Varanasi, India

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ABSTRACT

This may be understood as a conflict between the self-interest of its members and the greater good of society as a whole in large-scale dispersed ecosystems Mechanisms that give incentives and encourage cooperation are often required to control the participants' conduct to minimize the possibly unfavorable availability consequences that may follow from individual activities. Economics has a long and varied history of ways to encourage collaboration. Bartering incentive patterns provide an ideal basis for a simple and resilient kind of trade for re-allocating resources in this thesis. Bartering is one of the oldest forms of commerce in the world, yet it still amazes us in many ways. The barter system's success and long-term viability make it a good model to analyze. When it comes to the Internet, bartering is becoming more commonplace. Making trade recommendations for an "online bartering platform" is a lot like making conventional recommendations, especially when it comes to modeling users' tastes and the attributes of the goods they consume. Some elements, however, make bartering difficulties intriguing and complex, notably the fact that users are both providers and customers, together with a highly dynamic business setting. "It is important to understand not just the preferences of users but also the social dynamics of who trades with whom, and the time dynamics of transactions occurring. In this paper, we will study the ways of analyzing road accident prediction techniques.

Keywords - Bartering, SGD, ICON3, Matrix Factorization, The Binary Value Exchange Model, Circular Exchange Of A Single Item

I. INTRODUCTION

A. Overview

This may be understood as a conflict between the self-interest of its members and the greater good of society as a whole in large-scale dispersed ecosystems Mechanisms that give incentives and encourage cooperation are often required to control the participants' conduct to minimize the possibly unfavorable availability consequences that may follow from individual activities.

Economics has a long and varied history of ways to encourage collaboration. Bartering incentive patterns provide an ideal basis for a simple and resilient kind of trade for re-allocating resources in this thesis. Bartering is one of the oldest forms of commerce in the world, yet it still amazes us in many ways. The barter system's success and long-term viability make it a good model to analyze.

When it comes to the Internet, bartering is becoming more commonplace. Making trade recommendations for an "online bartering platform" is a lot like making conventional recommendations, especially when it comes to modeling users' tastes and the attributes of the goods they consume. Some elements, however, make bartering difficulties intriguing and complex, notably the fact that users are both providers and customers, together with a highly dynamic business setting. It is important to understand not just the preferences of users but also the social dynamics of who trades with whom, and the time dynamics of transactions occurring.

B. Background Of The Barter System

In Jackson Hole, Wyoming, in August 2000, the world's economic leaders convened for an annual policy summit.

The chiefs of the central banks of Japan, Britain, and some other nations were in attendance, including Alan Greenspan.

"Mervyn King, Deputy Governor of the Bank of England," was one of the guests who reflected on the influence of internet commerce and the future of money.

C. Big Barter Networks - A Mix of the Old and the New

For example, in the modern-day, the introduction of computers not only transformed the global but also helped to revive trading. Bartering has become a simple and low-cost method of trade as a result of the new technology's incredible monitoring and inventory management capabilities. In today's world, bartering is a great way to get a wide range of goods, from computers to jewelry to books to CDs to movies to hotel rooms.

There is no end to it.

- Bartering is a large industry, and it's just becoming bigger.
- These stories demonstrate the complexity and resurrection of modern-day bartering.

The following are a few instances of amazing deals:

"Fujitsu laser printers were exchanged for 1.7 million units of military ready-to-eat (RTE) meals, which were then sold to relief groups for urgent use in the hurricane-ravaged states of Florida and Hawaii. Due to conflicts in the Persian Gulf, there was no need for the RTEs."

"An arrangement signed by PepsiCo, Inc. in April 1990 was the biggest trade transaction between a U.S. firm and the former Soviet Union, bringing in more than $3 billion in total retail sales for the two countries."

To establish hundreds of bottling operations and "Pizza Hut" locations in the "Coalition of Independent States," PepsiCo will be able to utilize foreign currency credits from vodka sales.

In exchange for practically nothing, the Lexington Hotel in New York City received a cutting-edge computer system.

Computers were purchased in 1991 by a barter business in return for more than $300,000 in "hotel room credits" that the firm could use or, with the hotel's consent, sell or trade for other products or services.

Bartering extra office space for products and services is another new trend.

Advertisement time, hotel rooms, and office equipment are just a few of the items that SGD and ICON3 exchange for spare space.

The fabled purchase of an island by "Peter Minuit" in 1626, in which he traded 60 gold pieces worth of

trade items for an island known as Manhattan, is an example of the power of barter.

When it comes to electronic bartering, file-sharing programs are one of the most prominent instances of peer-to-peer trading.

Using the bartering method, a peer can receive about equal amounts of incoming data and outgoing data.

In both public and private settings, large-scale network exchanges of collaborative information are becoming more common.

In the second case, obtaining a membership requires that you have a connection to an existing member. For example, "file-sharing networks":

- Broadcasting of movies and television programs
- Patches and upgrades are distributed
- Global e-commerce might be transformed through bartering, thanks to the Internet.
- Trading has returned to our "economic systems" as a result of the Internet.
- Being able to link an endless number of traders and provide an infinite number of possibilities for trading partners.

II. THREE IMPLICATIONS OF THE BARTERING ADVANTAGE

The bartering strategy is used in three different circumstances in this thesis.

- Using a standard bartering model as a starting point:
- Using a bartering environment, we demonstrate the costs and consequences of dealing with selfish actors, including topology and leaked knowledge.
- Bartering has a lot of promise before it can be used effectively in the real world.
- A new paradigm is examined in this thesis, which examines the earliest system of commerce.
- We demonstrate how bartering may be used to get items without the presence of altruistic actors.
- The Internet is a worldwide network of computer networks that are all linked together.
- Real-world Internet directory services are the focus of our bartering strategy.
- High transaction costs have often plagued economies based mostly on bartering.
- Bartering is the "Internet Age" is the focus of this study.
- Many of the difficulties of prior eras may be addressed in this linked society.

III. INTRODUCTION TO THE IDEAL MODEL

The economy is believed to have been barter-based from its start [1]. The introduction of money as a means of trade and a unit of measurement facilitated the valuation of assets and shaped current economic practices. Barter has re-emerged in the lives of 21st-century consumers as a result of extensive digital communication [2]. Economic models have been resurrected based on the premise that things may be extended to service numerous owners, or that users can get access to obscure or difficult-to-obtain items. Swapping CDs, DVDs, books, and other media may be done on a variety of platforms, including swapacd.com, swapadvd.com, readitswapit.co.uk, and bookmooch.com.

In contrast, the aforementioned systems lack methods to propose deals, necessitating a user-driven search for suitable trading partners. To barter, there must be a double coincidence of 'wants,' meaning that both parties want the things of the other. This makes it difficult to complete the transaction. Bartering has a lot of potential to enhance the customer experience, especially in light of the current trend toward environmentally friendly activities.

It's not clear how best to propose transactions on an online bartering platform, however, some study has been done.Barterquest.com, for example, uses a trade

matching approach, however, their data was unavailable. However, user preference modeling is not a part of their matching process.

It is necessary to identify potential trade partners within the platform's user base before constructing a recommender system for bartering platforms.

Users on the site have a public "Want List" and a public "Give-Away List" of products they'd want to give away in return for the items they want.

There has been some initial research on the issue [3] that offers a tight matching criterion between the explicit user "wants" and "haves," resulting in trade compatibility only if their reciprocal want lists/give-away lists meet.

In real-world datasets obtained from online bartering platforms, we discover that such an approach is very unsuccessful since the double coincidence of "wants" and "haves" is quite low, with less than 5% of users being qualified to get suggestions.

A system with the ability to provide "serendipity" is necessary, as shown by actual data showing that things being transacted are not necessarily on users' wish lists before the transaction.

So-called "recommendation engines" would be capable of recommending products a user likes, but which are not indicated among their preferences, either because they removed them from the wish list or are ignorant of their existence.

Summary: Existing methodologies often do not provide suggestions that are consistent with observed transactions, presumably indicating that users are influenced by factors other than those disclosed by wish list analysis.

Using Matrix Factorization [4], we offer a model that estimates cross-references between possible trading partners, or more specifically the level of reciprocal interest that two consumers have for each other's products.

Finally, we'd want our system to identify the most probable things to be traded between every given pair of potential users. Then, based on the sorted list of partner-item pairings, we may provide swap suggestions.

We begin with a classic matrix factorization technique, which we then expand by including social and temporal dynamics since we discover that users gain confidence in trading partners via repeated transactions and prefer to trade in bursts of recurrent activity.

As a way to capture these impacts, we offer a socially and temporally aware model that significantly outperforms earlier matching-based techniques and "vanilla" matrix factorization.

Three large-scale real-world datasets, including want lists, give-away lists, and actual transaction histories, are also part of our effort. This enables us to qualitatively assess our methods by comparing them to those that have already taken place and those that haven't taken place. Data from bartering platforms suggest a radically different user behavior from what was previously anticipated. This contribution is incredibly essential.

An assessment method that has been unexpectedly absent from prior studies on bartering is used to compare the quality of the suggestions generated with the real-world evidence provided by the historical data. Bartering data from the real world is used as an example to demonstrate the limitations of a state-of-the-art item exchange technique [3].

Rather than depending on the imperfect truth offered by users' wish lists, our technique addresses various limitations of earlier approaches by using user preference modeling.

To provide additional options and serendipity, we may utilize this method to rank all of the swap possibilities that a user has in the system.

In August 2000 the world's economic leaders met for an annual policy conference in Jackson Hole, Wyoming. Alan Greenspan was there, as were the heads of the central banks of Britain, Japan, and 26 other countries.

One of the attendees, Mervyn King, Deputy Governor of the Bank of England, ruminated on the impact of electronic commerce and the future of money. His conclusion, quoted below, was startling to some:

- There is no reason that products and services could not be swapped directly by consumers and producers through a system of direct exchange–essentially a massive barter economy.
- All it requires is some commonly used unit of account and adequate computing power to make sure all transactions could be settled immediately.
- People would pay each other electronically, without the payment being routed through anything that we would currently recognize as a bank. Central banks in their present form would no longer exist–nor would money."

A standard dictionary defines barter as trading goods or services without the exchange of money. This is conducted between parties who have products or services that each other needs or wants. The keyword here is need. Barter has survived to this day. Why? Simply because people needed it then, as they need it now, only the methods have changed over time.

In the days before the Internet, skilled business owners performed barter exchanges mostly by word-of-mouth, choosing to approach others in other trades based in a large part on the recommendations of business owners they knew and trusted. At present barter has been used in situations of economic crises, as in the U.S. or recently in Argentina1. In these situations, money loses its value, and obtaining goods requires the use of other means. In this context, barter offers up a way to interchange goods with similar values. However, bartering has many other sides where it is relevant. This thesis explores cases where bartering could be applied. The thesis first develops a common model for bartering amongst electronic entities and then explores several different bartering scenarios with diverse and exclusive properties. Starting each case from the same model, specific properties are studied. Results are subsequently verified using simulations and analysis which to explore the dynamics underlying each scenario and the validity of the model is checked.

In human society, resource reallocations are, in most cases, performed through markets. This occurs on many different levels and many different scales, from our daily grocery shopping to large trades between big companies and/or nations. Barter has been used many times as a way to supply the needs of developing societies.

The large–scale barter networks – In the modern-day, the advent of computers not only revolutionized the world but also facilitated a sudden resurgence of bartering. The tremendous capabilities of this new technology of tracking barter transactions and maintaining huge inventories made bartering an easy and inexpensive form of trading. Today, it is amazing to see what can be obtained through bartering: computer hardware and software, household items, jewelry, books, CDs, movies, hotel accommodations, etc. The list is endless. Barter is a big business and getting bigger with every passing day.

Several modern barter tales illustrate the growing sophistication and resurgence of the barter. Some examples of exciting transactions:

- A broker arranged the exchange of 500 Fujitsu laser printers for 1.7 million units of military ready-to-eat (RTE) meals, which were in turn sold to relief agencies for immediate use in hurricane-ravaged Florida and Hawaii. The RTEs were surplus from the Persian Gulf conflict.
- In the largest trade deal ever inked between a U.S. corporation and the former Soviet Union, PepsiCo, Inc. agreed in April 1990 to renew its agreement to trade Pepsi-Cola concentrate syrup for Stolichnaya Russian vodka until the year 2000 – a pact worth more than $3 billion in total retail sales. Several innovative countertrade

mechanisms will allow PepsiCo to use foreign exchange credits from vodka sales to build dozens of bottling plants and several Pizza Hut restaurants in the Coalition of Independent States.

- New York City's Lexington Hotel obtained a sophisticated computer system for almost nothing. In 1991, a barter firm gave the hotel money to buy the computers in exchange for more than $300,000 in room credits that the firm could use or, with the hotel's approval, sell or barter for other goods or services.
- Another recent innovation is bartering goods and services for excess office space. Both SGD and ICON3 trade advertising time, hotel rooms, or office equipment, among other goods and services, for unused space.
- Occasionally, barter gets amazing deals as the legendary purchase of an island by Peter Minuit, who in 1626 bartered trade goods valued at 60 gold coins for an island called Manhattan.

One of the most visible examples of electronic bartering today is the use of peer–to–peer technology to complete multi-party barter exchanges in file-sharing applications. The bartering strategy ensures that for a peer the amount of incoming data is roughly equal to the amount of outgoing data. The use of mass collaborative network exchanges goes from public to private environments. In this latter, to get an account it is necessary to know someone who is already a member (e.g. funfile4, pretome5, stmusic6). File–swapping networks have been used for:

- Changed the values of music and its role in the music industry's future
- Diffusion of films and TV shows
- Distribution of patches and upgrades

With the inherently global Internet, bartering could change the face of global e-commerce. The Internet reintroduced bartering back into our economic systems. Being capable of connecting an infinite number of traders and opening an unlimited opportunity for trade partners.

IV. SCENARIOS OF THE BARTERING APPROACH

A long and diverse history of economic incentives for cooperation. In this thesis, bartering incentive patterns give a simple and robust way to re-allocate resources. The earliest method of business, bartering, still impresses us. Barter's success and longevity make it a valuable model to study. Throughout this thesis, we have specified three relevant situations in which the bartering approach may be used. Let's start with a well-known bartering arrangement:

- An Internet directory service application is used to demonstrate how a bartering–based technique might be used.
- We explain how agents, utilizing bartering, may acquire benefits in commodities without altruistic agents having to be present.
- In a bartering environment, we show the cost of dealing with selfish agents, as well as the impact on performance indicators like topology and disclosed information.

The exploration of bartering in the Internet Age is at the heart of this research. High transaction costs (i.e. the improbability of the desires, requirements that trigger a trade occurring at the same time and location) have plagued economies dominated by bartering in the past "(i.e. the improbability of the wants, needs that cause a transaction occurring at the same time and place)." Today, the Internet is a global system of interconnected computer networks that span the globe. This interconnected world may overcome many of the challenges of previous eras. Within the context of this new paradigm, this thesis investigates the oldest system of trade. We want to show in this thesis that bartering has a lot of promise, but that it also has a lot of challenges that need to be investigated.

V. OVERVIEW OF THE PROPOSED MODEL

The economy is said to have been barter-based from its inception [1]. Money ultimately emerged as a medium of exchange and a measure of value,

simplifying asset valuation and shaping today's economic practices. Barter has made a comeback in the 21st century because of the increased use of digital communication [2]. Economic models have been resurrected based on the premise that things may be extended to service numerous owners, or that users can get access to obscure or difficult-to-obtain products. bookmooch.com, readitswapit.co.uk, swapadvd.com, and Swapacd.com, are just a few of the many sites that allow people to trade products of all kinds.

It's also worth noting, though, that these systems are quite ad-hoc and can't propose transactions to their members. To barter, there must be a double coincidence of 'wants,' meaning that both parties want the things of the other. This makes it difficult to complete the transaction. Bartering is a natural match for green practices; therefore this challenge has a lot of promise for enhancing the user experience. In contrast, little study has been carried out on the best ways to propose deals on an online bartering platform.

Other services, including barterquest.com [5] use a trade matching approach, however, their data was unavailable. However, user preference modeling is not a part of their matching process.

It is necessary to identify potential trade partners within the platform's user base before constructing a recommender system for bartering platforms. Users on the site have a public "Want List" and a public "Give-Away List" of products they'd want to give away in return for the items they want. There has been some initial research on the issue [3] that offers a tight matching criterion between the explicit user "wants" and "haves," resulting in trade compatibility only if their reciprocal want lists/give-away lists meet. A surprising result of this technique is that it fails miserably on real-world datasets gathered from online bartering platforms where the coincidence between "wants" and "haves" is so low that suggestions can be made to less than 5% of the users. A system with the ability to provide "serendipity" is necessary, as shown by actual data showing that things being transacted are not necessarily on users' wish lists before the transaction. For example, an automated system could suggest products that a person likes but aren't explicitly stated in their preferences, either because the user overlooked them when creating the wish list or because they are unaware of their existence. Current approaches, according to our results, do not give recommendations that are consistent with observed transactions, which might imply that customers are impacted by variables other than those revealed by wish list research.

Using Matrix Factorization [4], we offer a model that estimates cross-references between possible trading partners, or more accurately the level of reciprocal interest that two users have for each other's products. Ultimately, our objective is to identify the most probable goods to be traded between a pair of users, and we do this by calculating the sorted list of partner-item combinations in order of reciprocal preference.

Traditional matrix factorization algorithms are used to generate an initial model, which is then further enhanced by including social and temporal dynamics since we've found that users establish confidence in trading partners over time by engaging with them repeatedly. There are significant gains over earlier matching-based techniques, as well as 'vanilla' matrix factorization, in our model to capture these impacts, which is both socially and temporally aware.

This enables us to assess the quality of our methods by comparing how well they rank completed transactions with those that have not. This is a critical addition since the data shows that bartering platforms' users behave substantially differently than previously thought.

For the first time, we evaluate the validity of our suggestions by comparing them to the actual bartering histories that have been obtained [2, 3, 4]. An item exchange approach that has been around for a while is compared and critiqued using real-world bartering datasets. In contrast to earlier solutions, our

methodology addresses many shortcomings by using user preference modeling rather than depending only on users' wish lists to solve the issue. We may use this method to rank all of a user's swap options in the system, resulting in more options and a greater chance of serendipity.

"Social and artificial societies" both rely on trade as a fundamental economic principle. The exchange theory covers a wide range of topics:

- Sociology assumes that all social life may be understood as a kind of transaction between agents. See [5] and [6] for further information.
- Exchanges between people and those who have political power are referred to as "politics." [7]
- The exchange of commodities and services is the basis of economics MAS [8]
- MAS [8], Grid [9], and P2P [4] are examples of Artificial Societies that allow for the exchange of digital commodities or resources.

Ancient and contemporary civilizations alike have relied on barter as a medium of commerce. Many various" aspects of "distributed Artificial Societies" might benefit from barter, from file sharing to query forwarding, from routing, from knowledge dissemination, from storage–sharing systems, to WIFI hotspot sharing, to name just a few. Commercial systems like Linspot7, Netshare8, and Fon9 make use of this technique. Other examples are BizXchange, ITEX Bartercard, Continental Trade Exchange, and the Bartercard. The Internet Age is full of expectations for barter arrangements. [10] and [11] both say:

"Is it possible that advances in technology will mean that the arbitrary assumptions necessary to introduce money into rigorous theoretical models will become redundant and that the world will come to resemble a pure exchange economy? Electronic settlements in real-time hold out that possibility."

By Nicholas Negroponte:

"A parallel and more intriguing form of trade in the future will be barter. Swapping is a very attractive form of exchange because each party uses a currency that is devalued for them i.e. an unwanted possession, that otherwise would be wasted. The most stunning change will be peer–to–peer, and peer–to–peer–to–peer.. transactions of goods and services. While this is nearly impossible to do in the physical world, it is trivial in cyberspace. Add the fact that some goods and services themselves can be in digital form, and it gets easier and more likely."

Ad-hoc networks, multi-agent systems, and peer-to-peer networks are all examples of distributed situations where bartering is an appealing paradigm to explore. These are obvious instances of large-scale contexts where efficient bartering methods may be seen in action. For the resources of the *participants* to be exploited, these communities' members must work together as independent entities. If a system does not have the correct incentives, it may be rendered pointless by selfish conduct. External motivations for collaboration are necessary to counteract this. When it comes to incentives, a bartering strategy is proposed [12].

VI. LITERATURE REVIEW

A. Overview

Other studies that are closely similar to ours include studies of bartering and trade in general, as well as models of users' latent preferences for particular commodities. Each of these topics is covered in depth in the sections that follow.

B. Priority Work on the Best Barter Exchange Strategies, Begin As Early As Possible

The kidney exchange dilemma [14, 15] sparked early work on exchange market algorithm design [16]. For patients with incompatible live donors, algorithms have been devised to identify cross-matched patient-donor combinations in the regional transplant pool. By employing The Top Trading Cycles and Chains mechanism, Roth et al. [17] have addressed the issue Haddawy et al. [18] address the issue of identifying a balanced match between buyers and sellers in the

setting of barter trade exchanges, which is an important study. There is an intermediary in charge of managing the transactions, and the parties are matched according to their supply and demand information and their credit in terms of a private-labeled currency. On a network, a least-cost circulation issue is modeled. And last but not least, the work of Mathieu [19] attempts to solve the challenge of locating bartering rings in an online marketplace by using weighted trees to compare the similarity of search and offer queries.

C. Circular Exchange Of A Single Item (CSEM)

A bartering network's exchange cycles are more complex than the kidney exchange dilemma. Users in a standard exchange market have numerous products to give away and perhaps multiple incoming items, rather than receiving and giving one item (a kidney). A directed network with nodes representing users and edges tagged with item IDs is used by Abassi et al. [20]. It is up to the users to decide what they want to buy and what they want to give away. Potential transactions may be seen in this graph by looking for directed cycles.

D. The Binary Value Exchange Model (Bvem)

"Su et al. [3] address the item exchange issue for "cycles of length two, which is a distinct approach (i.e., swaps). Competitive online situations such as online games with a heavy real-time updating schedule may benefit from the system. For this reason, the value to be optimized is the sum of all possible gains for each of the users.

Many recommender systems use Matrix Factorization (MF). The low-rank approximation is used to estimate user preferences that are not seen in the user settings and the item set [21]. MF guesses these preferences using a sparse interaction n matrix R R|U||I|. An item's compatibility with a user is determined by the dot product of the user's interaction with the item and the low-dimensional space in which the user and the item are placed.

To address social interactions and temporal dynamics, we mostly draw upon existing theories that extend the MF to integrate social regularisation [22] and "temporal dynamics in recommender system" (RS) recommendations [21].

E. This is a personal ranking of 2.5 in the Bayesian language (BPR)

Rendle and co-authors [24] have developed an optimization process called Bayesian personalized ranking that directly optimizes a ranking measure. [17] (AUC). Implicit feedback is readily handled by this method since it simply analyses interactions that are 'positive' between the user and the object, while not distinguishing between observations that are negative or absent. Users prefer products they have seen over those they haven't, and this intuition is crucial. Matrix Factorization or "Adaptive k-Nearest-Neighbors" [17] may be used in combination with this pairwise optimization strategy.

VII. CONCLUSIONS AND FUTURE WORK

A variety of data mining approaches have been used to analyze the accident dataset, including SOM (Self-Organizing Map), K-modes, Hierarchical clustering, latent class clustering (LCC), BIRCH clustering, and classification techniques such as Support Vector Machines (SVM), Nave Bays, Decision Trees (Random Forest, J-48, etc.), Multilayer Perceptrons, Lazy Classifiers (K-star and IBK), BIRCH clustering The classification accuracy is enhanced by this method based on casualty class so that it can be seen what factors affect (like most accidents occurred between 12:00 and 20:00 and the driver was involved in most of the cases, Dry road surface, day lightening condition, clear weather condition, most of them are youth and adult, mostly car involved in the accident, weekday, Male, etc.) and who is involved more in an accident between the driver, passenger or pedestrian. SVM, Naive Bays, and Decision Tree classification accuracy is better on k-modes clusters than on SOMs, according to the findings of the first experiment. For road accident data with categorical variables, k-mode

clustering would be a better alternative than other methods, according to this study. Improvements have been made to the accuracy of the first result, and the second result is a consequence of this. When compared to k-mode clustering, the results using hierarchical clustering were superior.

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