

PROTECTING YOUR SHOPPING PREFERENCE WITH DIFFERENTIAL PRIVACY

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ABSTRACT

Online banks may disclose consumers' shopping preferences due to various attacks. With differential privacy, each consumer can disturb his consumption amount locally before sending it to online banks. However, directly applying differential privacy in online banks will incur problems in reality because existing differential privacy schemes do not consider handling the noise boundary problem. In this paper, we propose an Optimized Differential private Online transaction scheme (O-DIOR) for online banks to set boundaries of consumption amounts with added noises. We then revise O-DIOR to design a RO-DIOR scheme to select different boundaries while satisfying the differential privacy definition. Moreover, we provide in-depth theoretical analysis to prove that our schemes are capable to satisfy the differential privacy constraint. Finally, to evaluate the effectiveness, we have implemented our schemes in mobile payment experiments. Experimental results illustrate that the relevance between the consumption amount and online bank amount is reduced significantly, and the privacy losses are less than 0.5 in terms of mutual information

1 INTRODUCTION

In the last decade, online banks were commonly used to provide financial services. However, online banks are vulnerable to outsider and insider attacks. Outsider attacks include brute-force attacks, distributed attacks and social phishing. Insider attacks are data misused by people with authorized access. Outsider and insider attackers can collect the financial information of consumers to infer personal shopping preferences, consumption patterns or credit statistics. If consumers' shopping records are disclosed, consumers may receive advertisement recommendation, harassing message and fraud emails. More seriously, it contributes to loan promotion, illegal investigation, property fraud, and even kidnapping. If consumers have no reasonable assurance of their accounts, they would be reluctant to use online banks, leading to user loss and higher cost for online banks. Therefore, appropriate methods are required to stem the erosion of privacy rights in online banks. To protect consumers' privacy, existing approaches mostly used cryptography. Cryptography schemes mainly utilized encryption technology and authentication technology, which could prevent illegitimate and unauthorized access.

Literature Survey

Protecting shopping preferences with differential privacy involves ensuring that individual preferences or behaviours cannot be accurately determined from the data released. Here's a literature survey on this topic:

Differential Privacy: A Survey of Results (Dwork, 2008):

This foundational paper discusses the concept of differential privacy, which aims to provide strong guarantees about the privacy of individual data points in a dataset while still allowing for accurate analysis.

3 IMPLEMENTATION STUDY

EXISTING SYSTEM:

If consumers' shopping records are disclosed, consumers may receive advertisement recommendation, harassing message and fraud emails. More seriously, it contributes to loan promotion, illegal investigation, property fraud, and even kidnapping [11]. If consumers have no reasonable assurance of their accounts, they would be reluctant to use online banks, leading to user loss and higher cost for online banks. Therefore, appropriate methods are required to stem the erosion of privacy rights in online banks.

Proposed System & algorithm

we propose an optimized differential private online transaction scheme (O-DIOR), in which we define a new noise probability density function. The fundamental strategy is to basically eliminate the probability that noise is generated beyond the boundaries. The scheme can satisfy the differential privacy definition because the noise can be any value in a valid range to avoid the case that the consumption amount and noise can be inferred.

IMPLEMENTATION

In this module, the admin has to login by using valid user name and password. After login successful he can do some operations such as View all users and authorize, View all Transport Users and authorize, Register and Login (With Bank Name), View all users and authorize, View All Transport company users and authorize, Add bank with its details such as name, address, location, bpin, mailed, bcno, add building image, View Credit card request and Process with Ac. No and CRN, credit limit, Card cvv (4digit) number Cash Limit., View all transport booking fees details for each company based on cluster, View all transport booked details for each company based on cluster, View all type of Fraud based on cluster, View all users with Fraud and give link to show number of same user is fraud in chart.

5 RESULTS AND DISCUSSION

5.1 Home Page



Fig 5.1 Home Page

5.2 Admin Registration

localhost:8084/Protecting_Your_Shopping_Preference_with_Differential_Privacy/AdminRegister.jsp

Welcome To Admin Registration Page..

Select Bank (required) Bank of Maharashtra ▾

Vendor Name (required)
shyam

Password (required)

Email Address (required)
shyam@223

Mobile Number (required)
9999989898

Your Address
kaza

Date of Birth (required)
09-07-97

Select Gender (required)
MALE ▾

Select Profile Picture(required) Choose File download (2).png

REGISTER

Back

5.2 Admin Registration

5.3 Consumer registration

localhost:8084/Protecting_Your_Shopping_Preference_with_Differential_Privacy/UserRegister.jsp

Consumer Registration Form

Select Bank (required) Bank of Maharashtra ▾

User Name (required)
shyam

Password (required)

Email Address (required)
shyam@223

Mobile Number (required)
09999898999

Your Address
kaza

Date of Birth (required)
09-08-99

Select Gender (required)
MALE ▾

Select Profile Picture(required) Choose File download (2).png

Select Finger Print(required) Choose File deepu.png

REGISTER

5.3Consumer Registration

5.4 Merchant Registration

localhost:8084/Protecting_Your_Shopping_Preference_with_Differential_Privacy/AdminRegister.jsp

Welcome To Admin Registration Page..

Select Bank (required) Bank of Maharashtra ▼

Vendor Name (required) shyam

Password (required) *****

Email Address (required) shyam@223

Mobile Number (required) 9999989898

Your Address kaza

Date of Birth (required) 09-07-97

Select Gender (required) MALE ▼

Select Profile Picture(required) Choose File download (2).png

REGISTER

Back

5.4 Merchant Registration

5.5 Auditor Login

PROTECTING YOUR SHOPPING PREFERENCE WITH DIFFERENTIAL PRIVACY

HOME PAGE LOGOUT

Welcome To Auditor Login..

User Name (required) Auditor

Password (required) *****

Login

Back

5.5 Auditor Login

5.6 Admin Login

PROTECTING YOUR SHOPPING PREFERENCE WITH DIFFERENTIAL PRIVACY

[HOME PAGE](#) [LOGOUT](#)

Welcome To Bank Admin Login

Select Bank (required)

User Name (required)

Password (required)

[New Admin? Register](#)

[Back](#)

5.6 Admin Login

5.7 Admin Menu

PROTECTING YOUR SHOPPING PREFERENCE WITH DIFFERENTIAL PRIVACY

[HOME PAGE](#) [LOGOUT](#)

Welcome to Bank :: Bank of Maharashtra

Admin Menu

- Home
- View Consumers and Authorize
- View Bank Account Request and Generate 11 Digit Account No
- View Money Transfer Request and Process Statement Via Auditor
- View Money Transfer Request and Process Statement Via Agent
- View Money Deposit Request and Process Statement Via Auditor
- View Money Deposit Request and Process Statement Via Agent
- View All Frauds and Human Behavior
- View All Frauds Results
- Logout

Consumer Uses An Online Payment Application

Merchant

Consumer's Account in Online Bank

Security Module

Consumer's Account

1 Bill Request

2 Noise Request

3 Noise Generation

4 Noise Response

5 Deposit/Withdraw Money with Noise

6 Bill Payment

5.7 Admin Menu

5.3.8 Consumer Login

PROTECTING YOUR SHOPPING PREFERENCE WITH DIFFERENTIAL PRIVACY

[HOME PAGE](#) [LOGOUT](#)

Welcome To Consumer Login..

Select Bank (required)

Select Finger Print(required) No file chosen

User Name (required)

Password (required)

[New User? Register](#)

[Back](#)

5.8 Consumer Login

5.9 Merchant Login

PROTECTING YOUR SHOPPING PREFERENCE WITH DIFFERENTIAL PRIVACY

[HOME PAGE](#) [LOGOUT](#)

Welcome To Merchant Login..

Select Agent Name

User Name (required)

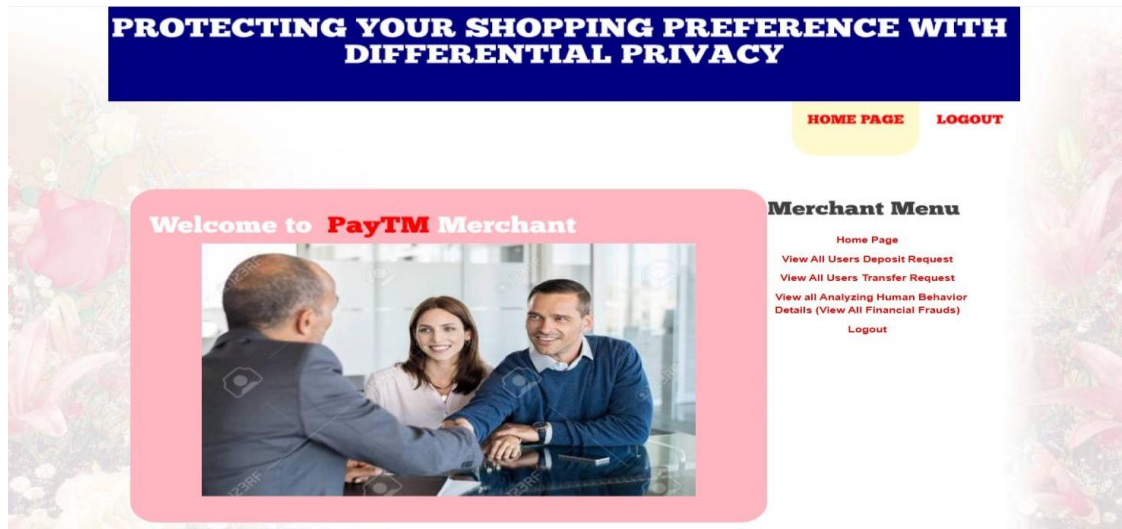
Password (required)

[New User? Register](#)

[Back](#)

5.9 Merchant Login

5.10 Merchant Menu



5.10 Merchant Menu

5.11 Admin Data

shopping.preference.admin: 15 rows total (approximately)											
#	id	bank	username	password	email	mobile	address	dob	gender	image	
1	3	Canara Bank	karan	karan	karan@gmail.com	8976757654	Rajajinagar	02/08/1990	MALE	0xC3A2E2B2ACC2B050-E470D0A1A0A000000000-494844...	
2	3	SBI Bank	Sridhar	Sridhar	sridhar@gmail.com	8976757654	Jayanagar	9-6-1976	MALE	0xC3A2E2B2ACC2B050-E470D0A1A0A000000000-494844...	
3	4	Bank of Maharashtra	mahi	mahi	mahi@gmail.com	8767546789	malleswaram	27-07-1993	MALE	0xC383C2BFC383C99CC383C2BFC383C2A000-10444649...	
4	5	Canara Bank	maresh	maresh	maresh@gmail.com	9902377486	bng	22/03/1995	MALE	0xC38FC398C3BFC3A000-104446494600010100000100...	
5	6	Canara Bank	raju	raju	raju	9902377486	bng	22/03/1995	MALE	0xC2B08055-E470D0A1A0A000000000-49484452000000...	
6	7	Canara Bank	sujan	sujan	sujan@yahoo.com	83627273837	dH-Bdsh	22/03/94	MALE	0xC38FC398C3BFC3A000-104446494600010200000400...	
7	8	SBI Bank	Raghu	Raghu	tnksmanu13@gmail.com	9535866270	#6726, 14th Cross, Malleshwaram	05/06/1987	MALE	0xC38FC398C3BFC3A000-104446494600010100000100...	
8	9	SBI Bank	sandeep	sandeep	sandeep@gmail.com	966623654	ameerpet	13/11/1990	MALE	0xC38FC398C3BFC3A000-104446494600010100000100...	
9	10	SBI Bank	dinesh	dinesh	as@a.com	9347233321	vslp	11-may-1999	MALE	0x8950-E470D0A1A0A000000000-494844520000078000...	
10	11	SBI Bank	krishna	krishna	krishna@123	728869123	slvp	11aug2000	MALE	0x8950-E470D0A1A0A000000000-49484452000006A000...	
11	12	Canara Bank	madhav	madhav	madhav@234	7881207878	kant	05-july-1999	MALE	0x8950-E470D0A1A0A000000000-494844520000062000...	
12	13	Bank of Maharashtra	prasad	prasad	prasad@456	9177701217	maharashtra	21-12-1998	MALE	0xFDF08FEE000-1044464946000101000001000000FFD...	
13	14	Bank of Maharashtra	harsha	harsha	harsha@112	8464982622	kontheru	09-jan-2000	MALE	0xFDF08FEE000-1044464946000101000001000000FFD...	
14	15	Karnataka Bank	nirish	nirish	nirish@789	9177701217	nelamooru	11-jan-1997	MALE	0x8950-E470D0A1A0A000000000-494844520000078000...	
15	16	Karnataka Bank	nirish	nirish	nirish@789	9177701217	nelamooru	11-jan-1997	MALE	0x8950-E470D0A1A0A000000000-494844520000078000...	
16	17	SBI Bank	ganesh	ganesh	ganesh@567	728869124	penugonda	11-dec-2000	MALE	0xFDF08FEE000-1044464946000101000000000000FFD...	
17	18	SBI Bank	anil	anil	anil@900	08000155479	kaza	13-4-2007	MALE	0x8950-E470D0A1A0A000000000-494844520000062000...	
18	19	Corporation Bank	akash	akash	akash@112	8142747422	akivadu	01-02-2007	MALE	0x8950-E470D0A1A0A000000000-494844520000078000...	
19	20	Bank of Maharashtra	shyam	shyam	shyam@223	0999989999	kaza	09-08-99	MALE	0x8950-E470D0A1A0A000000000-494844520000078000...	

Admin Menu

5.11 agent data

shopping.preference.agent: 12 rows total (approximately)											
#	id	bank	username	password	agent_name	email	mobile	address	dob	gender	loginstatus
1	1	SBI Bank	kumar	kumar	PayTM	kumar@gmail.com	966623655	ameerpet	12/11/1990	MALE	waiting
2	2	SBI Bank	sa	sa	PayTM	sa@gmail.com	9666452536	Bakurpet TempleAmeerpet	12/11/1991	MALE	waiting
3	3	SBI Bank	madhu	madhu	PayTM	sa@a.com	9347233321	vslp	11-may-1999	MALE	waiting
4	4	SBI Bank	krishna	krishna	PayTM	krishna@123	728869123	slvp	11-aug-2000	MALE	waiting
5	5	Canara Bank	madhav	madhav	PayTM	madhav@234	07981207878	kant	05-july-1999	MALE	waiting
6	6	Bank of Maharashtra	prasad	prasad	Select	prasad@456	9177701217	maharashtra	21-12-1998	MALE	waiting
7	7	Bank of Maharashtra	harsha	harsha	PayTM	harsha@112	08464982622	kontheru	09-jan-2000	MALE	waiting
8	8	Karnataka Bank	nirish	nirish	PayTM	nirish@789	9177701217	nelamooru	11-jan-1997	MALE	waiting
9	9	Select	ganesh	ganesh	Select	ganesh@567	0728869124	penugonda	11-dec-2000	MALE	waiting
10	10	SBI Bank	anil	anil	PayTM	anil@900	08000155479	kaza	13-4-2007	MALE	waiting
11	11	Corporation Bank	akash	akash	PayTM	akash@112	8142747422	akivadu	01-02-2007	MALE	waiting
12	12	Bank of Maharashtra	shyam	shyam	PayTM	shyam@223	0999989999	kaza	09-08-99	MALE	waiting

5.12 Agent Data

5.13 transfer data

View All Transfer Requests and Approve..

User Name	Bank Name	From Account No	To Account No	Amount	Date and Time	From	Status(Transfer To Bank)
tmksmanju	SBI Bank	640629398290	649704720362	5000	14/12/2018 12:55:18	User	Yes
tmksmanju	SBI Bank	640629398290	649704720362	43000	14/12/2018 14:55:24	User	Transfer To Bank
Manjunath	SBI Bank	641570119397	649704720362	5000	14/12/2018 17:51:34	User	Yes
Manjunath	SBI Bank	641570119397	649704720362	80000	14/12/2018 17:55:10	User	Transfer To Bank
sunny	SBI Bank	643018290551	641570119397	150	16/03/2019 22:13:27	User	Yes
sandeep	SBI Bank	647351941415	643018290551	2000	09/06/2021 23:15:52	User	Yes
harsha	Bank of Maharashtra	485556180039	5000	5000	21/06/2024 17:13:37	User	Yes
harsha	Bank of Maharashtra	485556180039	5000	5000	21/06/2024 17:14:34	User	Yes
akash	Corporation Bank	352368649517	5000	20000	30/06/2024 09:48:56	User	Transfer To Bank

Back

5.13 Transfer Data

5.14 Deposit Request

PROTECTING YOUR SHOPPING PREFERENCE WITH DIFFERENTIAL PRIVACY

HOME PAGE LOGOUT

View All Deposit Requests and Approve..

User Name	Bank Name	Account No	Amount	Date and Time	From	Status(Send To Bank)
tmksmanju	SBI Bank	640629398290	50000 Rs/-	13/12/2018 17:48:06	User	Yes
tmksmanju	SBI Bank	640629398290	1000 Rs/-	13/12/2018 18:04:21	User	Yes
tmksmanju	SBI Bank	640629398290	5000 Rs/-	14/12/2018 13:09:21	User	Yes
tmksmanju	SBI Bank	640629398290	1000 Rs/-	14/12/2018 13:22:50	User	Yes
Kamal	SBI Bank	649704720362	30000 Rs/-	14/12/2018 13:31:04	User	Yes
Manjunath	SBI Bank	641570119397	70000 Rs/-	14/12/2018 17:49:46	User	Yes
sunny	SBI Bank	643018290551	250 Rs/-	16/03/2019 22:05:37	User	Yes
sandeep	SBI Bank	647351941415	52000 Rs/-	09/06/2021 22:50:19	User	Yes
sandeep	SBI Bank	647351941415	52000 Rs/-	09/06/2021 22:51:03	User	Yes
raj	SBI Bank	647408429963	30000 Rs/-	15/06/2024 14:09:43	User	Yes

5.14 Deposit Request

6. CONCLUSION AND FUTURE WORK

protecting user data with differential privacy is a challenging problem for onlinebanks. the method of directly applying differential privacy is illustrated in a dior scheme. in this paper, we propose o-dior, a differential private online transaction scheme to address privacy concerns during financial transactions. o-dior can set boundaries of consumption amount with added noise, considering the range of accountbalance in reality.

with a payment application as a noise generator, activities and behaviours of consumers cannot be inferred from consumption records. next, we further revise o-diorto propose ro-dior, satisfying the need of selecting different boundaries. moreover, in- depth theoretical analysis has proved our schemes can satisfy the constraint of differential privacy.

7. REFERENCES

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