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Data Analytics for Evaluating Performance of E-Payment system

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Abstract:

Digitization changed the structure and nature of payment system in banking and eCommerce sector. It's not only applied for particular sector but today it is covered by each and every sectors liking industry, service sector, trading, international payment system. This study is based on data collected from two years from Jan. 2021 to Jan. 2023. Various e-payment modes like Prepaid, Debit card, Credit card, IMPS, UPI, NEFT and RTGS are taken for study. In this year data based on volume and value are divided. Mean, Standard deviation, average mean and maximum transactions calculated using python application. Also average transactions from 25%, 50% and 75% are calculated. From this study it reflects light on two facts, one is usage of UPI is increasing dramatically, whereas usage of Debit and Credit card usage decreasing subsequently. It throws light on red area for Debit and Credit card in future and having more scope more UPI payment systems.

Keywords: *Digitization, RTGS, NEFT, UPI, IMPS.*

1. Introduction:

Digital payment also refereed as electronic payment (e-payment) which is made through different delivery channels like Google pay, Phone pay, PayTm, QR code Debit, Credit card, NEFT, RTGS etc. recently RBI implemented e-rupee digital currency. This currency is becoming more popular in terms of usage, security, convenience etc.

2. Different types of e-payment systems are used:

Debit and Credit card payments- Card payments are done through Debit and Credit cards.

ATMs are most popular channel for card system. Apart from that, these cards are also used for eCommerce payments via different web sites like – amazon, flipkart, snapdeal etc.

Internet banking – Core bank system (CBS) is backbone for the internet banking. Via internet it becomes very convenient to pay online. Various popular modes of e- payment systems are- EFT, NEFT, RTGS, IMPS, UPI etc.

3. UPI Payments:

UPI gained immense popularity, in urban as well as in rural areas. Itis convenient for integrating multiple banks for payment system. Near about 224 banks are live on the UPI for providing quick services. Almost all banks uploaded their UPI enabled app on mobile. With that app users can make transaction to any bank on the basis of 24 * 7 * 365. Q-code is more popular and widely used e- payment system. It also support dual-authentication, generally One Time Password (OTP) and another biometric verification via- thumb, face, iris, palm, voice etc. The maximum amount supported for payment system up to Rs 1 lakh. Further no moreor extra charges charged for payment transfer. Various facilities to the customer are provided including-account balance, check the transaction history, send/pay money, collect money, add bank accounts, change/set MPIN, invite contacts to UPI, etc

4. Big data Analytics:

Data refers to facts and statistics collected together for reference or analysis data can collected, measure analyzed & visualized. Big data analytics is a process to extract meaningful insights from bigdata such as hidden patterns, unknown correlations, market trends, and customer preferences.

5. Objectives:

a. To study different e-payment systems

b. To study tools in data analytics for analysis purpose

c. To prepare data set and analyze it for identifying performance of e-payment systems.

6. Dataset preparation:

6.1 Python used for data set preparation. Data from 1 Jan. 2021 to 30 Jan.

2023 has been collected from RBI annual reports. Following data set prepared based on volume and value transactions.

	Unnamed: 0	RTGS Vol	RTGS Val	NEFT Vol	NEFT Val	UPI Vol	UPI Val	IMPS Vol	IMPS Val	(PPIs)Prepid vol	(PPIs)Prepaid values	Debit Card vol	Debit Card values
0	2023-01-02 00:00:00	8.32012	746955.130334	248.21187	133216.022617	2641.16	50488.22	173.69	19852.41	3.02565	69.838449	113.24611	2481.780132
1	2023-01-03 00:00:00	7.98827	552511.306432	179.65129	126606.171460	2616.09	47767.96	168.36	18786.80	3.08003	68.915417	75.25833	1619.096039
2	2023-01-04 00:00:00	7.83369	471603.960314	196.48705	102193.860449	2664.12	50171.67	173.58	19098.43	3.33920	80.398375	78.22651	1745.100458
3	2023-01-05 00:00:00	7.82633	480622.937637	194.52144	118202.611755	2680.05	48732.35	167.58	18526.18	3.10144	75.870368	74.57407	1656.614094
4	2023-01-06 00:00:00	8.15420	571645.572242	210.49383	126726.360841	2618.33	48665.71	164.75	17630.18	3.44534	81.167169	75.20322	1663.116002
...	...	...	...	...	...	...	...	...	...	...	...	...	...
478	2021-10-27 00:00:00	8.42210	433085.181046	121.80621	99593.537254	1341.27	25168.12	138.24	12837.21	9.11940	84.113482	95.70478	1875.572019
479	2021-10-28 00:00:00	8.52587	522592.763425	140.79314	118688.453732	1361.27	26359.34	140.57	13588.04	11.78035	77.485348	98.93674	2064.799709
480	2021-10-29 00:00:00	9.08190	648912.635582	207.08164	171953.837506	1391.84	27747.43	147.57	15285.69	9.58256	83.244257	102.28976	2063.616850
481	2021-10-30 00:00:00	8.05928	236918.389461	166.67572	110175.973193	1477.09	29919.39	154.19	15376.28	6.11696	92.318424	89.67642	1856.340221
482	2021-10-31 00:00:00	0.68573	5972.987612	39.65982	10671.116120	1469.32	24537.12	138.74	10639.47	5.74043	73.834504	96.82824	1987.661109

483 rows × 15 columns

Table 1. Dataset preparation using python

6.2 Volume and Value transactions from Jan. 2022 to Jan. 2023

Based on the above dataset count, mean, standard deviation, min. max values calculated. Also variations between 25%, 50%, 75% are also calculated. The values are as follows-

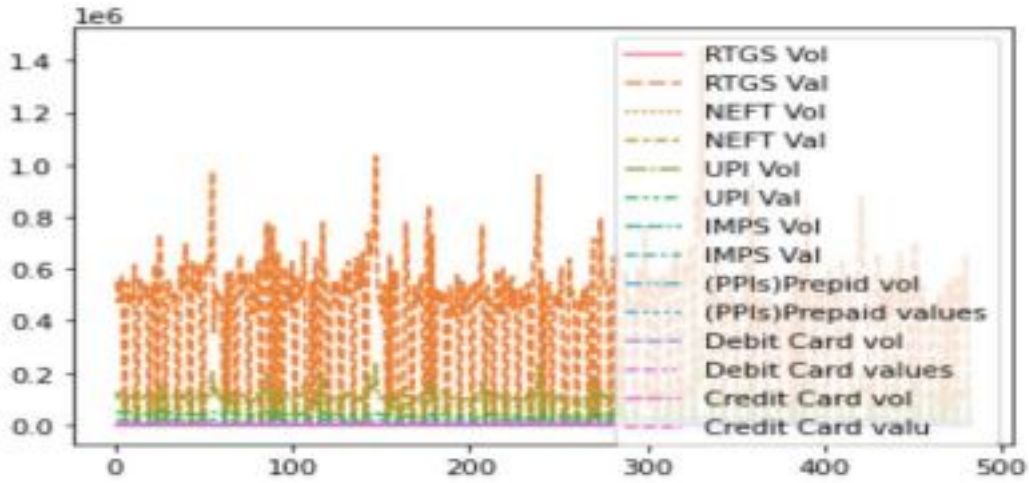
	RTGS Vol	RTGS Val	NEFT Vol	NEFT Val	UPI Vol
count	483.000000	4.830000e+02	483.000000	483.000000	483.000000
mean	6.402676	3.918842e+05	133.060054	88158.826565	1941.688857
std	3.280281	2.579176e+05	58.634772	50864.011361	405.272027
min	0.385270	3.055667e+03	24.382270	5242.172337	1185.110000
25%	4.288510	1.163583e+05	94.035185	54643.627591	1588.510000
50%	7.809320	4.808578e+05	140.676180	101352.359942	1932.970000
75%	8.498705	5.662730e+05	166.267155	115526.120567	2264.775000
max	14.254320	1.451701e+06	294.444380	372508.635644	2764.700000

	UPI Val	IMPS Vol	IMPS Val	(PPIs)Prepid vol
count	483.000000	483.000000	483.000000	483.000000
mean	33251.085038	150.589503	14203.375259	7.451669
std	7211.503158	14.630029	3178.843885	2.923795
min	16615.550000	104.800000	6429.550000	1.034500
25%	27719.110000	141.600000	12487.115000	5.434075
50%	33222.540000	151.200000	14613.140000	6.913990
75%	38374.215000	160.735000	16304.650000	9.663380
max	53457.060000	193.310000	22821.470000	16.037590

	(PPIs)Prepaid values	Debit Card vol	Debit Card values
count	483.000000	483.000000	483.000000
mean	124.430964	89.073747	1736.921399
std	48.153346	22.009432	455.096522
min	29.740545	45.874270	899.166041
25%	93.411391	74.561055	1450.530651
50%	116.154316	85.626750	1667.498143
75%	143.780674	94.959330	1847.424546
max	341.300180	201.639350	3867.928529

	Credit Card vol	Credit Card valu
count	483.000000	483.000000
mean	60.285741	2833.840305
std	18.160240	949.445695
min	27.094770	890.300900
25%	48.604260	2173.385704
50%	56.451710	2778.236534
75%	67.994080	3388.699701
max	121.466770	6675.740663

Table 2 Showing mean, std deviation, min, max etc.



Graph1 E-payment transactions through RTGS, NFT, UPI, IMPS, PPPs, Debit & Credit Card

6.3 Volume transactions:

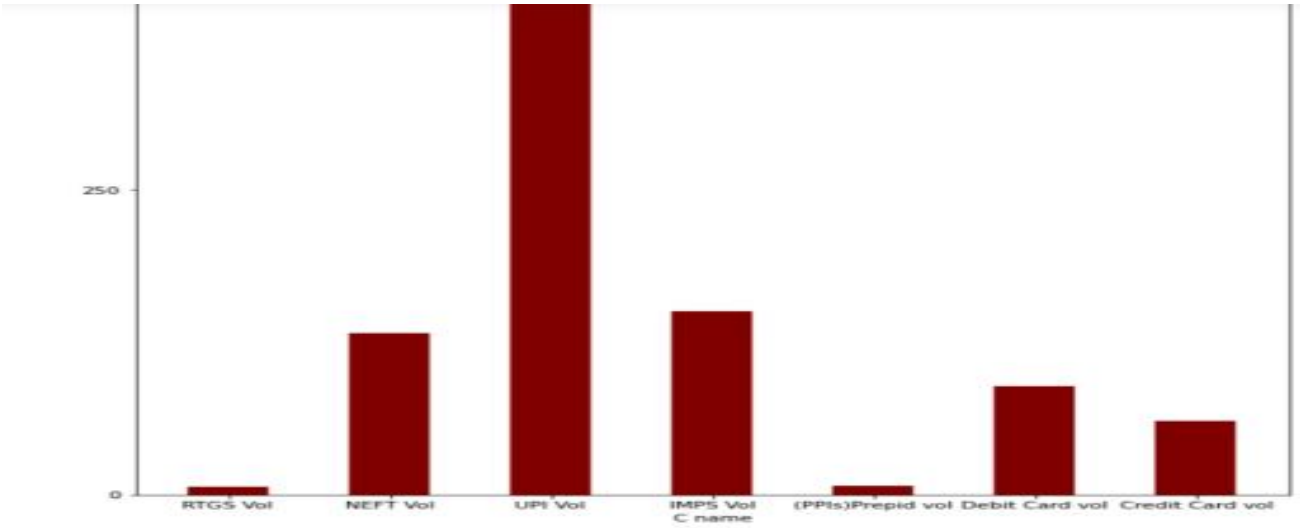
```
Sorted dictionary by volumes: {'RTGS Vol': 6.3986, '(PPIs)Prepid vol': 7.46,
'Credit Card vol': 60.192, 'Debit Card vol': 89.023, 'NEFT Vol': 132.8211, 'IMPS
Vol': 150.541, 'UPI Vol': 1940.25}
```

```
volumes: {'RTGS Vol': 6.3986,
          '(PPIs)Prepid vol': 7.46,
          'Credit Card vol': 60.192,
          'Debit Card vol': 89.023,
          'NEFT Vol': 132.8211,
          'IMPS Vol': 150.541,
          'UPI Vol': 1940.25}
```

By sorting data based on transactions in volume, lowest volume is of RTGS which is 6.3986 volume whereas, highest volume is of UPI payment mode which is 1940.25. IMPS is second last most popular transactions, majority transactions done through mobile apps, with volume 150.541. NEFT volume transactions are 132.8211 which are near to the IMPS.

From the above it is clear that usage of Debit & Credit cards is decreasing. Volume of credit card is 60.192 and volume of Debit card is 89.023, which is very low as comparing with the UPI payments. On the above dataset it is clear that, future scope for e-payment transaction is to UPI payments based on volume of transaction. In UPI payment method most popular delivery channels

are QR code, Google pay, Phone pay, Amazon pay, PayTM etc. Thus UPI becoming more popular and convenient method for e-payment system.



Graph 2 E-payment system based on volume of transaction

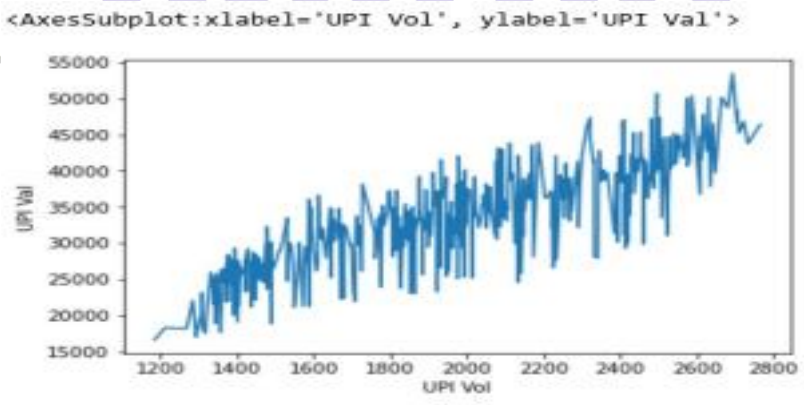
6.4 Values Transaction:

```
Sorted dictionary by values: {'(PPIs)Prepaid values': 124.54422615874269, 'Debit
Card values': 1735.3760485046334, 'Credit Card valu': 2828.891409343412, 'IMPS
Val': 14191.634522821581, 'UPI Val': 33215.32334722227, 'NEFT Val':
88065.34690491606, 'RTGS Val': 391147.5372749388}
```

```
values1={'(PPIs)Prepaid values': 124.54422615874269,
         'Debit Card values': 1735.3760485046334,
         'Credit Card valu': 2828.891409343412,
         'IMPS Val': 14191.634522821581,
         'UPI Val': 33215.32334722227,
         'NEFT Val': 88065.34690491606,
         'RTGS Val': 391147.5372749388}
```

On the basis of value transaction in 2 years it is observed that, very low transaction is of prepaid i.e. 124.54. Very high value transaction is of RTGS value which is 391147.53.

Debit and credit value transaction is also low. It is seen that, in value also end users are also least preferring Debit and Credit card as compared with UPI value payment which is 33215.32. In value transaction RTGS and NEFT are leading payment system, whereas Prepaid, Debit & Credit card are least value transactions.



Graph 3 UPI Value & volume

7. Conclusion:

On the basis of data analytics, it is conclude that, UPI payment system in volume transaction becomes leading e-payment system and in volume transaction RTGS and NEFT are leading e payment systems. From the above study it is seen that in future UPI payment system will be more demanded and most useful payment system for public. Because of its easy transaction, simplicity and security it becomes more popular. Whereas many businesses prefers RTGS and NEFT for large volume of transactions.

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