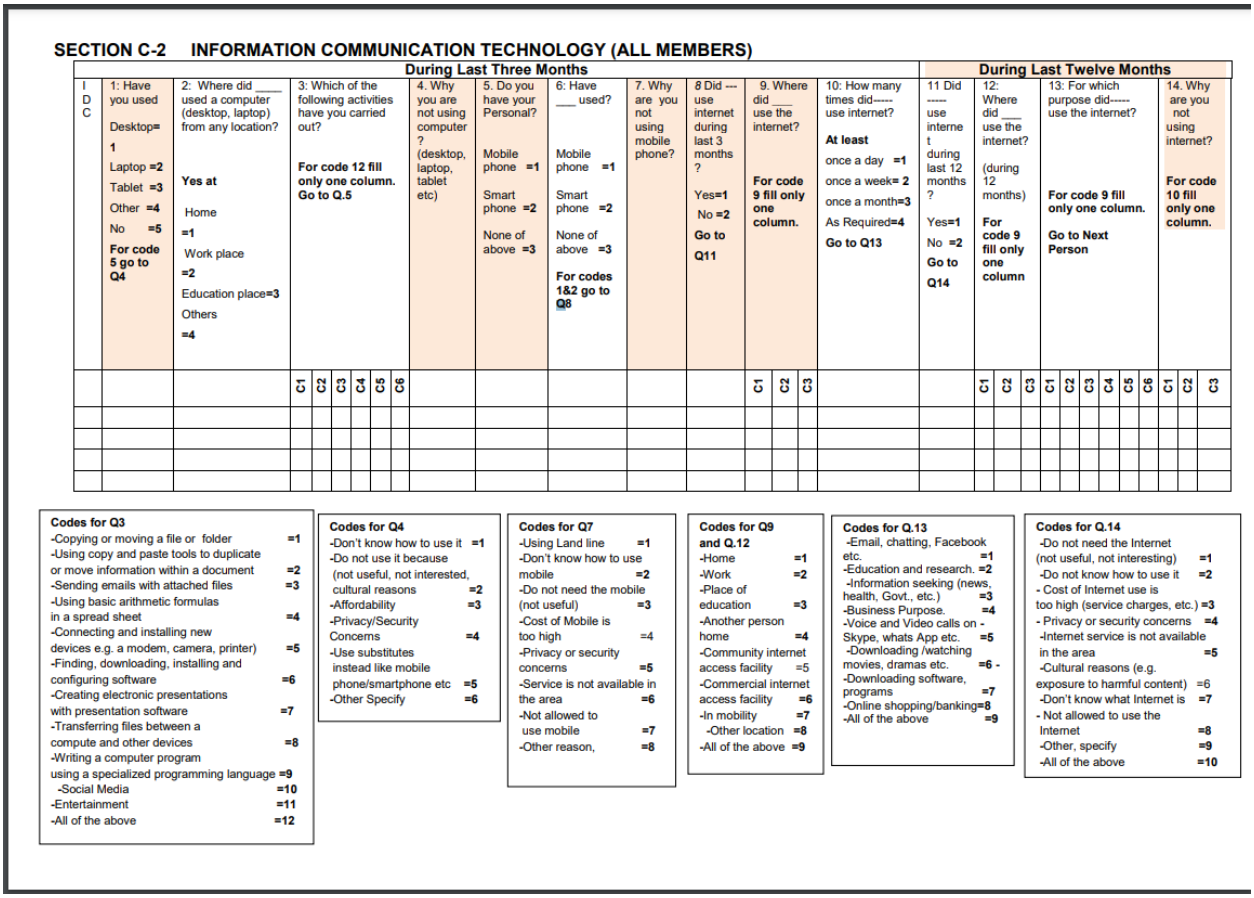
Calculation of ICT metric:



SECTION C-2 INFORMATION COMMUNICATION TECHNOLOGY (ALL MEMBERS)

	During Last Three Months															During Last Twelve Months											
ID C	1: Have you used Desktop=1 Laptop =2 Tablet =3 Other =4 No =5 **For code 5 go to Q4**	2: Where did ____ used a computer (desktop, laptop) from any location? **Yes at** Home =1 Work place =2 Education place=3 Others =4	3: Which of the following activities have you carried out? **For code 12 fill only one column. Go to Q.5**						4. Why you are not using computer ? (desktop, laptop, tablet etc)	5. Do you have your Personal? Mobile phone =1 Smart phone =2 None of above =3	6: Have ___ used? Mobile phone =1 Smart phone =2 None of above =3 **For codes 1&2 go to Q8**	7. Why are you not using mobile phone?	8 Did --- use internet during last 3 months ? Yes=1 No =2 **Go to Q11**	9. Where did ___ use the internet? **For code 9 fill only one column.**			10: How many times did----- use internet? **At least** once a day =1 once a week= 2 once a month=3 As Required=4 **Go to Q13**	11 Did ----- use internet during last 12 months ? Yes=1 No =2 **Go to Q14**	12: Where did ___ use the internet? (during 12 months) **For code 9 fill only one column**			13: For which purpose did----- use the internet? **For code 9 fill only one column.** **Go to Next Person**								14. Why are you not using internet? **For code 10 fill only one column.**		
			C1	C2	C3	C4	C5	C6						C1	C2	C3			C1	C2	C3	C1	C2	C3	C4	C5	C6	C1	C2	C3

Codes for Q3
-Copying or moving a file or folder =1
-Using copy and paste tools to duplicate or move information within a document =2
-Sending emails with attached files =3
-Using basic arithmetic formulas in a spread sheet =4
-Connecting and installing new devices e.g. a modem, camera, printer) =5
-Finding, downloading, installing and configuring software =6
-Creating electronic presentations with presentation software =7
-Transferring files between a compute and other devices =8
-Writing a computer program using a specialized programming language =9
-Social Media =10
-Entertainment =11
-All of the above =12

Codes for Q4
-Don't know how to use it =1
-Do not use it because (not useful, not interested, cultural reasons =2
-Affordability =3
-Privacy/Security Concerns =4
-Use substitutes instead like mobile phone/smartphone etc =5
-Other Specify =6

Codes for Q7
-Using Land line =1
-Don't know how to use mobile =2
-Do not need the mobile (not useful) =3
-Cost of Mobile is too high =4
-Privacy or security concerns =5
-Service is not available in the area =6
-Not allowed to use mobile =7
-Other reason, =8

Codes for Q9 and Q.12
-Home =1
-Work =2
-Place of education =3
-Another person home =4
-Community internet access facility =5
-Commercial internet access facility =6
-In mobility =7
-Other location =8
-All of the above =9

Codes for Q.13
-Email, chatting, Facebook etc. =1
-Education and research. =2
-Information seeking (news, health, Govt., etc.) =3
-Business Purpose. =4
-Voice and Video calls on - Skype, whats App etc. =5
-Downloading /watching movies, dramas etc. =6 -
-Downloading software, programs =7
-Online shopping/banking=8
-All of the above =9

Codes for Q.14
-Do not need the Internet (not useful, not interesting) =1
-Do not know how to use it =2
- Cost of Internet use is too high (service charges, etc.) =3
- Privacy or security concerns =4
-Internet service is not available in the area =5
-Cultural reasons (e.g. exposure to harmful content) =6
-Don't know what Internet is =7
- Not allowed to use the Internet =8
-Other, specify =9
-All of the above =10

Q1 Mapped 1-4 to 1 and 5 to 0. Unique Values: [0,1].

Q2 Used same values.

Q3 1-9 and 12 as it is. Mapped 10-11 to 1. Then summed the 6 columns. Unique Values: 1-38.

Q5 1-2 as it is. Mapped 3 to 0. Unique Values: 0-2.

Q6 Same as Q5.

Q8 1 as it is. Mapped 2 to 0. Unique Values: [0,1].

Q9 Counted the number of places used. Unique Values: 0-6 and 9.

Q10 Reversed the given key and subtracted 1. Unique Values: 0-3.

Q11 0-1 as it is. Mapped 2 to 0. Unique Values [0,1].

Q12 Same as Q9.

Q13 Counted the number of purposes. Unique Values: 0-6 and 9.

Summed all Columns to give the metric.

Description:

count	876356.000000
mean	2.698813
std	5.228768
min	0.000000
25%	0.000000
50%	1.000000
75%	2.000000
max	54.000000

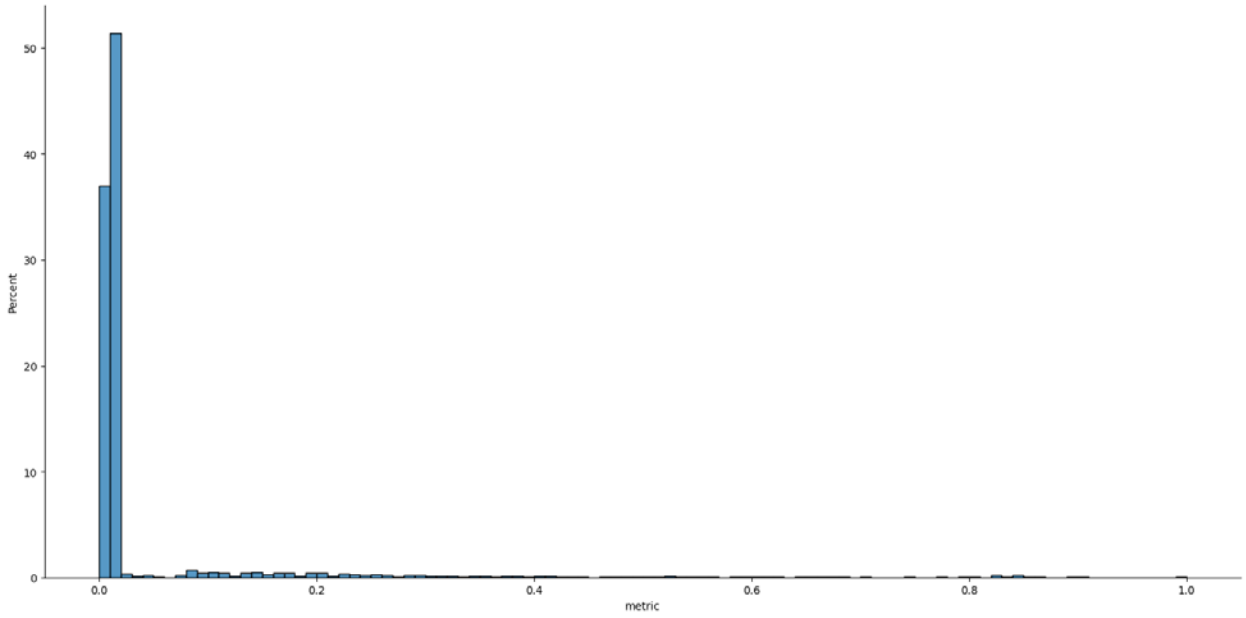
Normalized metric by dividing it with the max metric. Description:

count	876356.000000
mean	0.049978
std	0.096829
min	0.000000
25%	0.000000
50%	0.018519
75%	0.037037
max	1.000000

Insights:

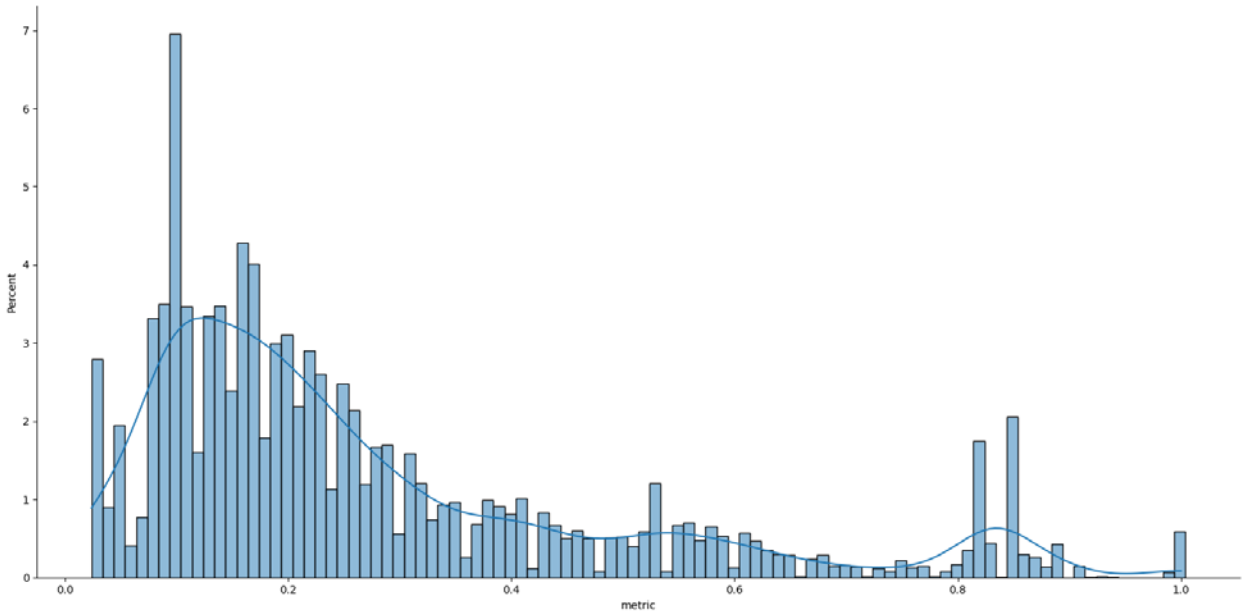
2015-2016:

ICT Index distribution:



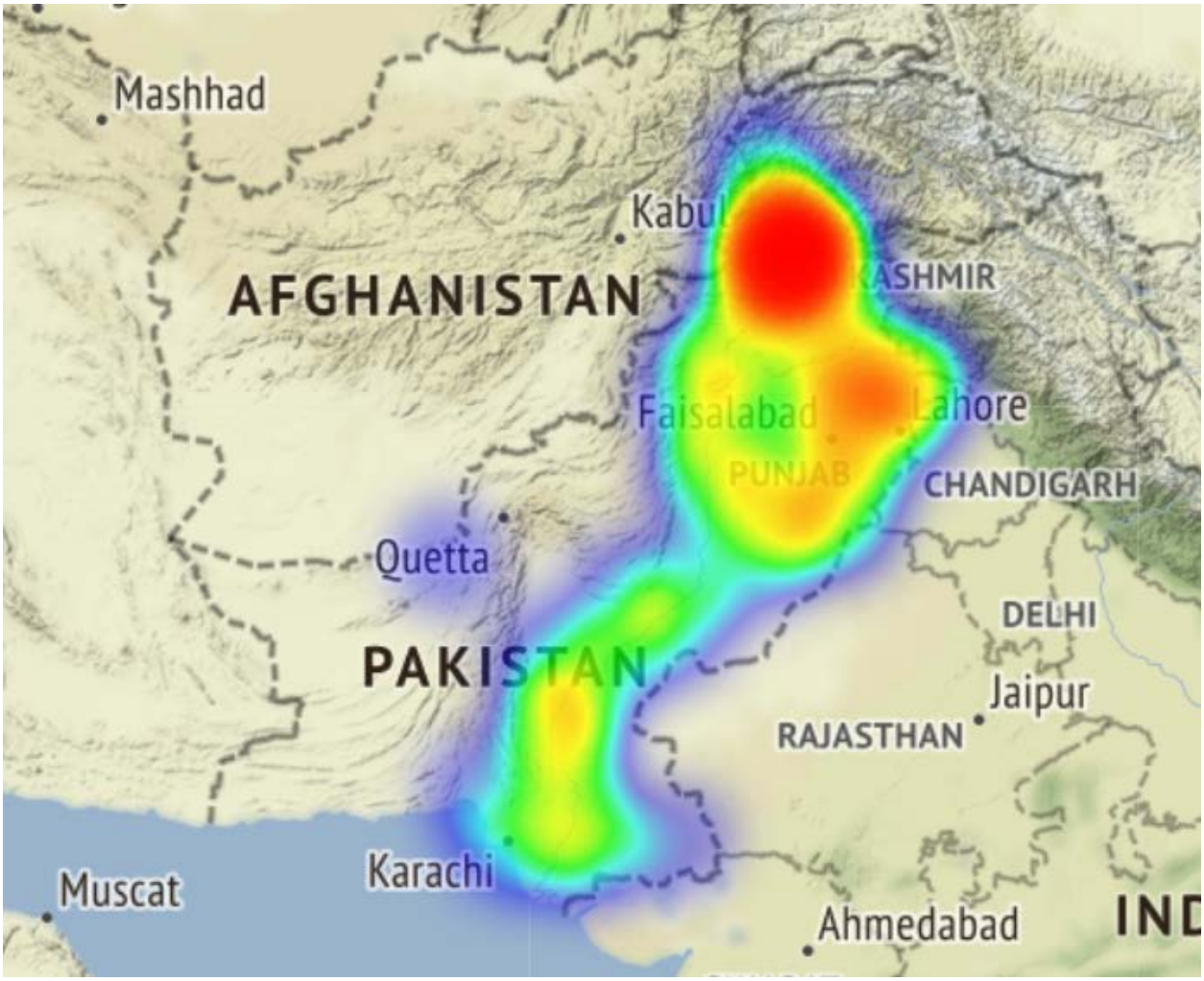
88% of all data has metric < 0.02. If we take that as an offset, the rest of the data is distributed

As follows:

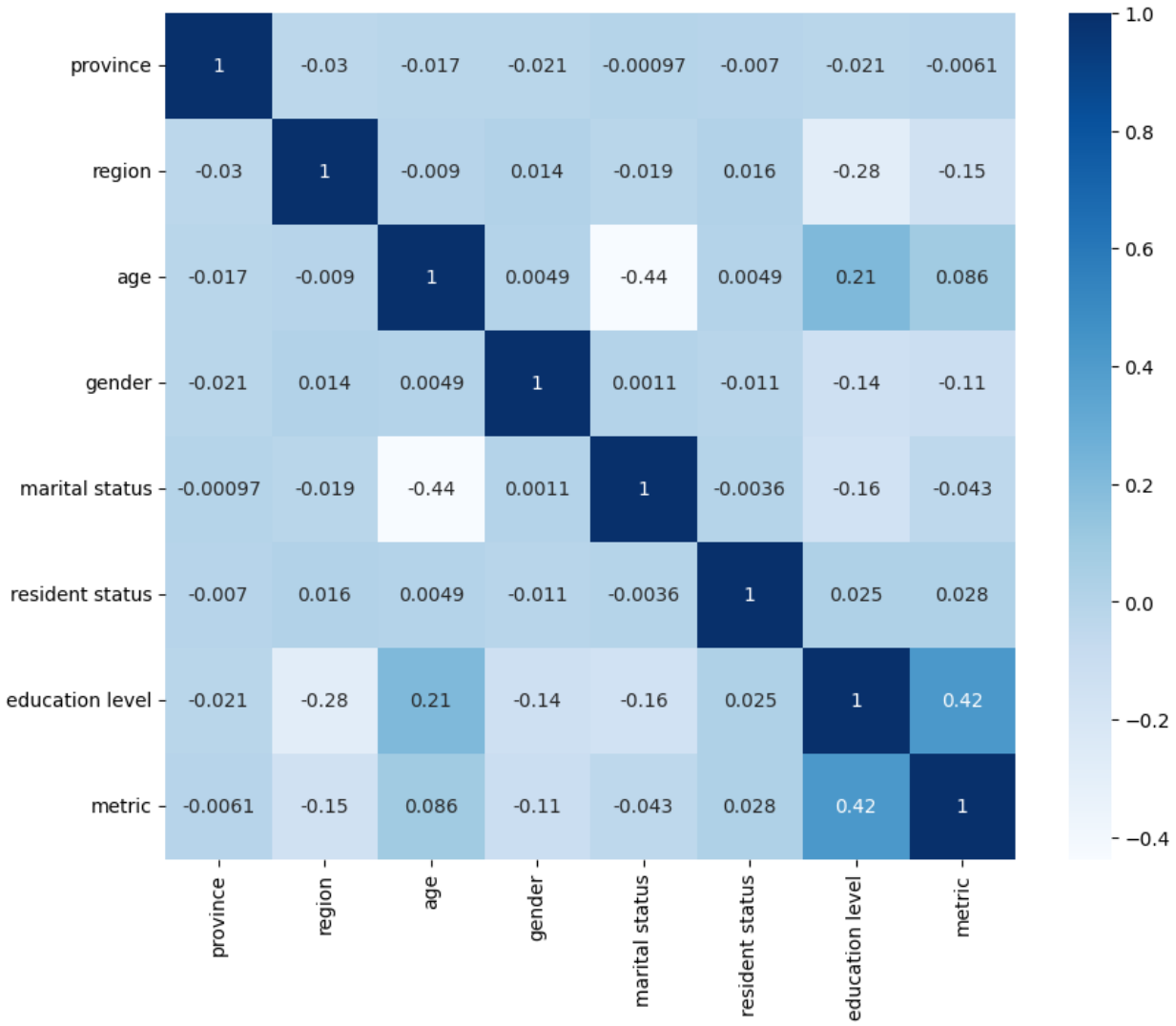


It has a large peak first around 0.12 and then it drops off until it has another comparatively smaller peak at 0.84.

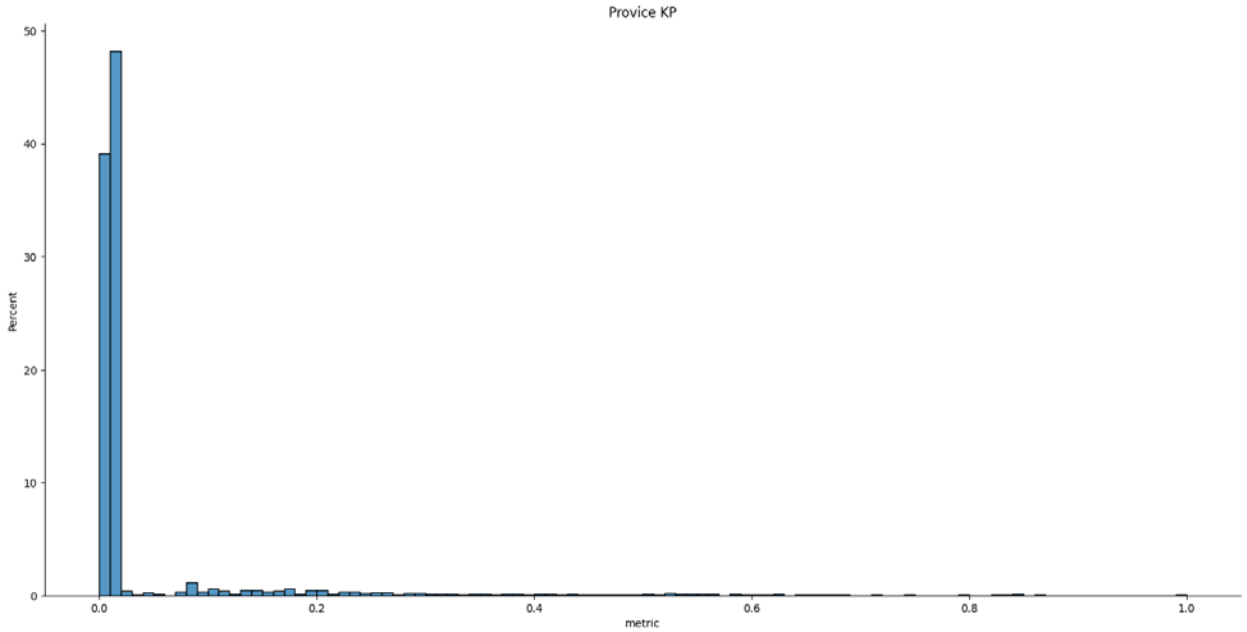
Spatial distribution:



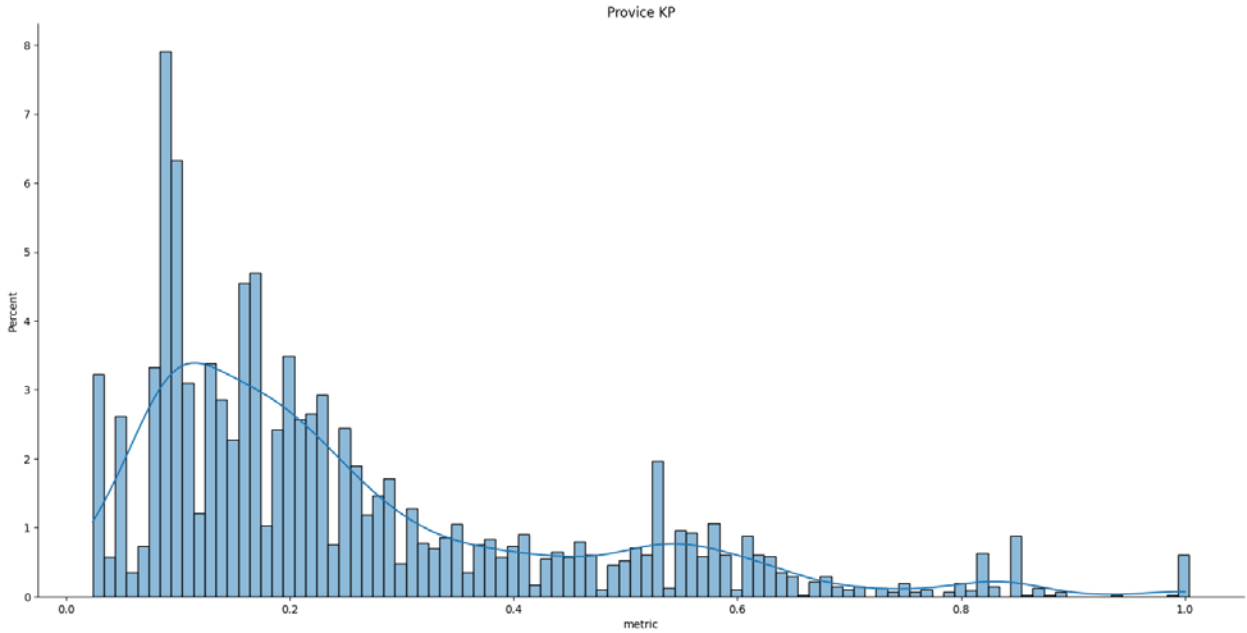
Demographic Correlation heatmap:



Distribution for KPK:

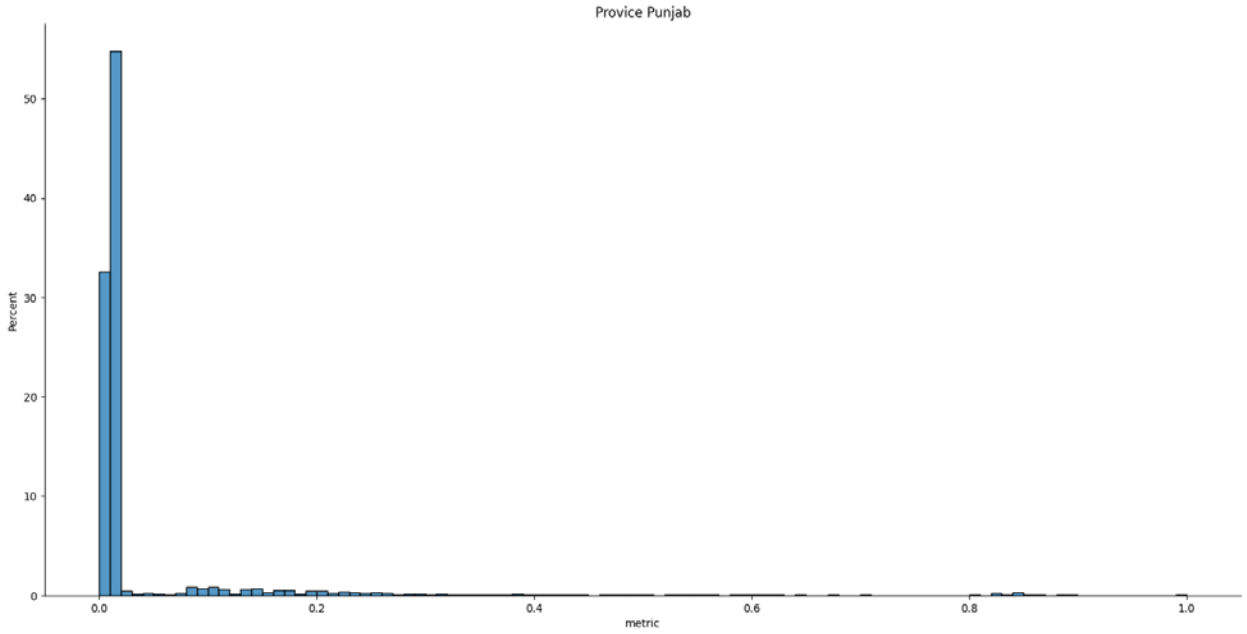


87% of the data has metric < 0.02. The rest of the data is distributed as follows:

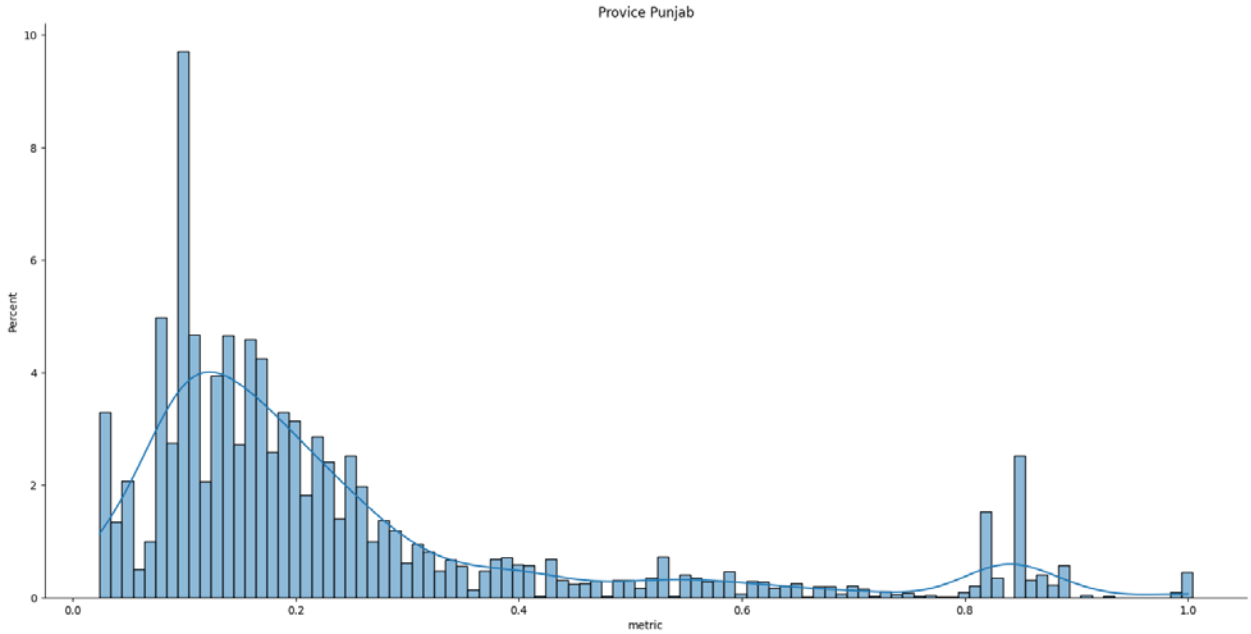


First it peaks around 0.15 and then it starts decaying with smaller peaks at 0.55 and 0.85.

Distribution for Punjab:

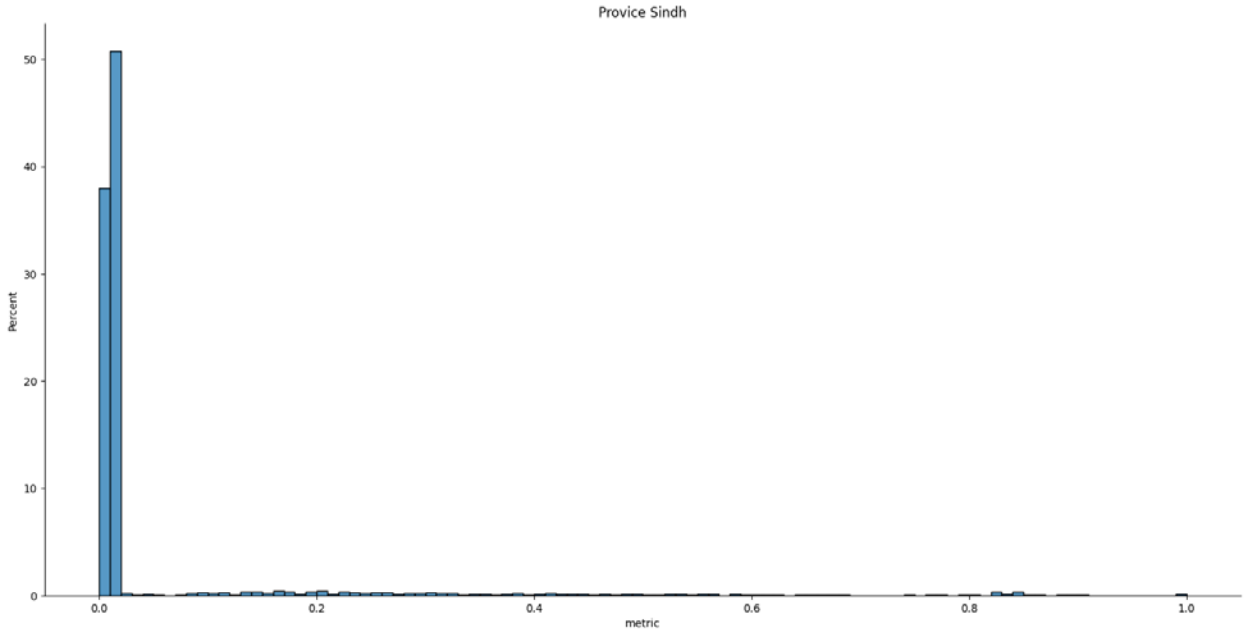


87% of the data has metric < 0.02. The rest is distributed as follows:

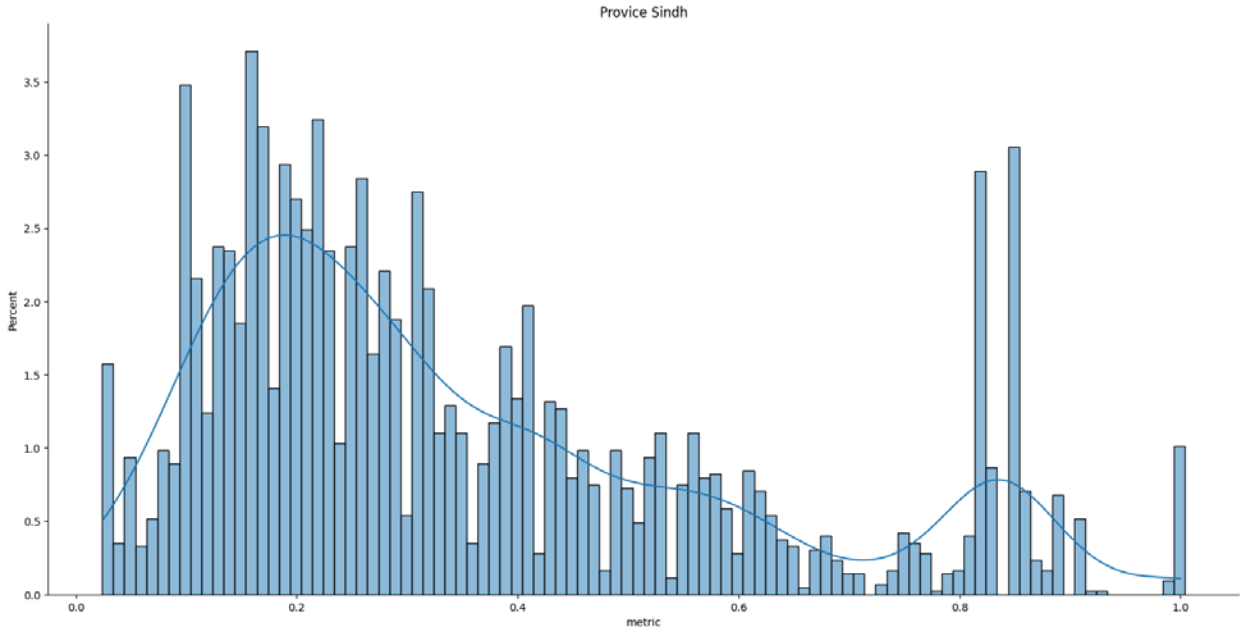


First it peaks at 0.17 and then it decays. Then there is a normal distribution with a small peak at 0.85.

Distribution for Sindh:

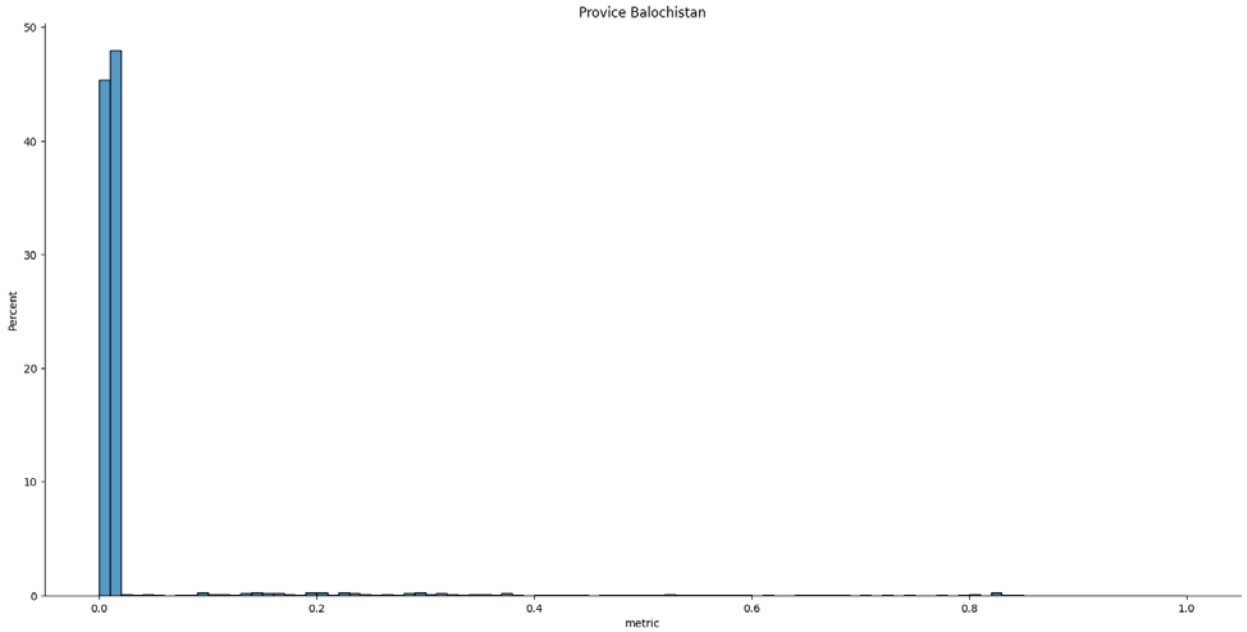


89% of the data has metric < 0.02. the Rest is distributed as follows:

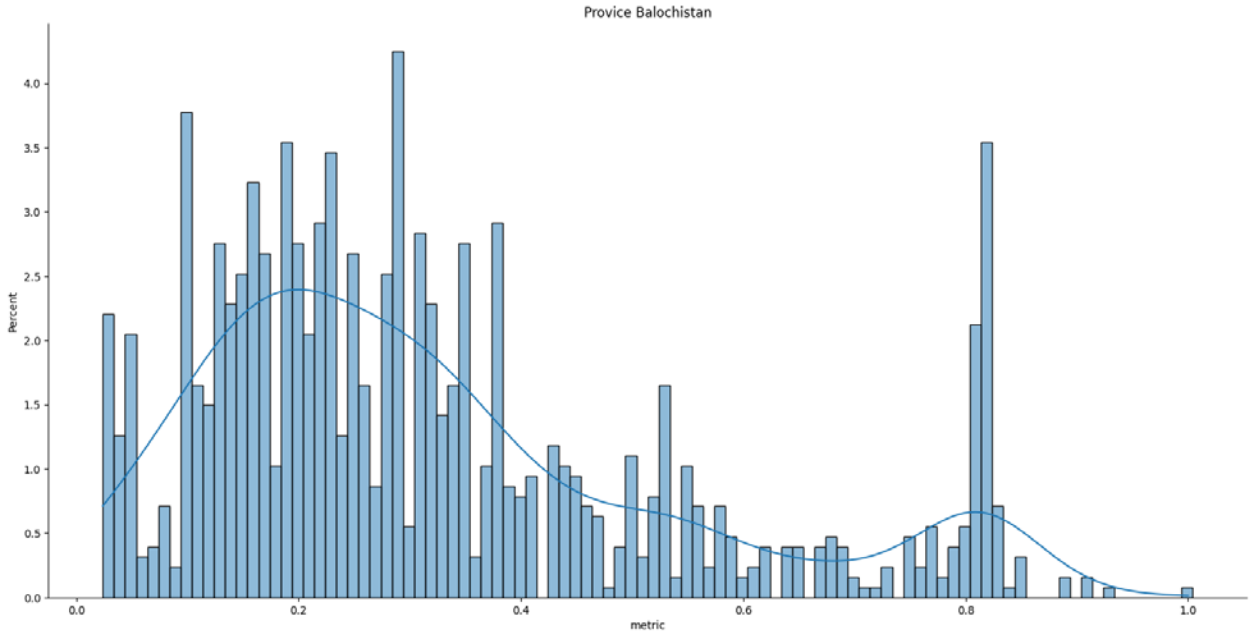


First a triangular distribution peaked at 0.2 till 0.7. Then a normal distribution at 0.82 with a similar sized peak.

Distribution for Balochistan:

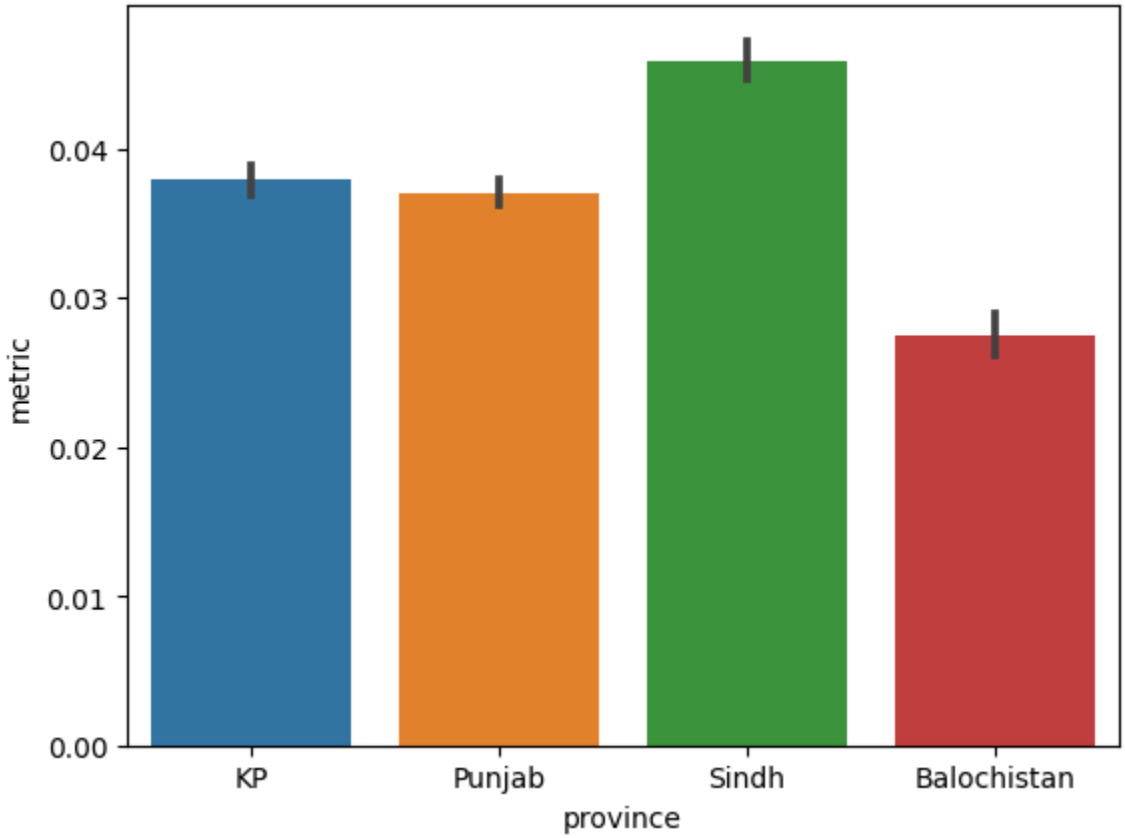


93% of the data has metric < 0.02 (highest). The rest is distributed as follows:



First a triangular distribution with peak at 0.2 till 0.7. Then a similar sized peak at 0.81.

Provincial Average metric comparison:



Sindh has the greatest average metric and that is statistically significant. KP and Punjab are at second with no statistically significant difference between each other. Balochistan is last but it is not as behind as in some of the later years. Which means digital literacy in Balochistan has increased slowly as compared to other provinces.

1.) Sindh 0.046

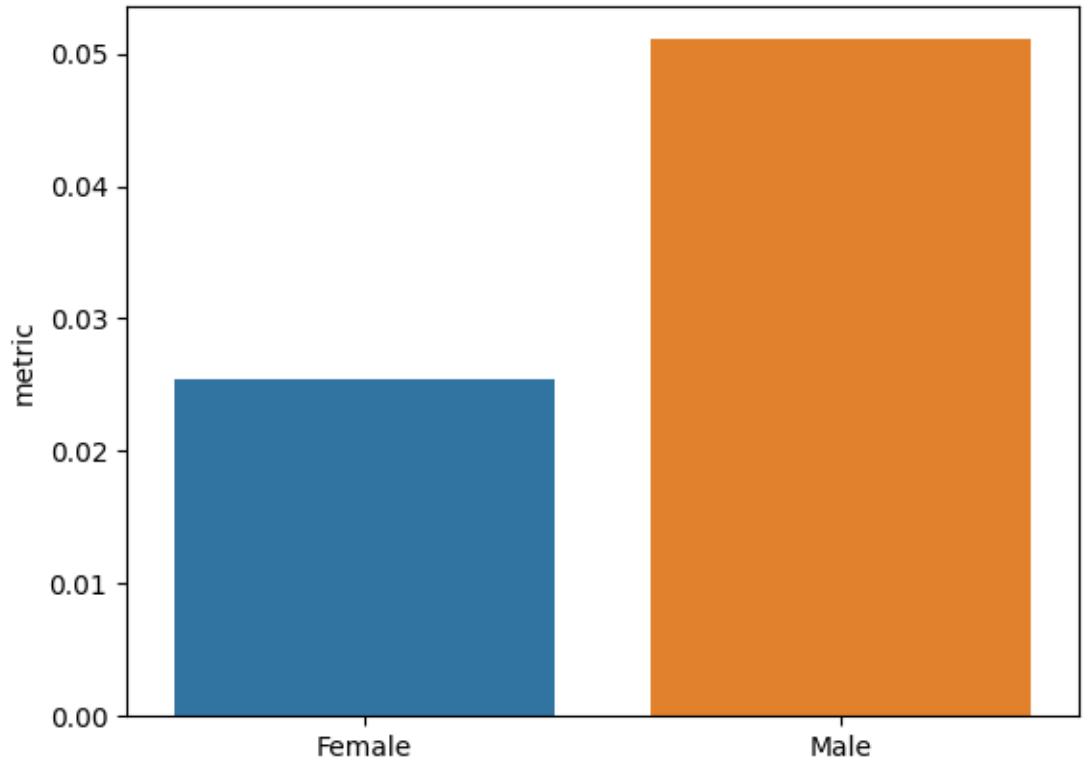
2.) KP 0.038

3.) Punjab 0.037

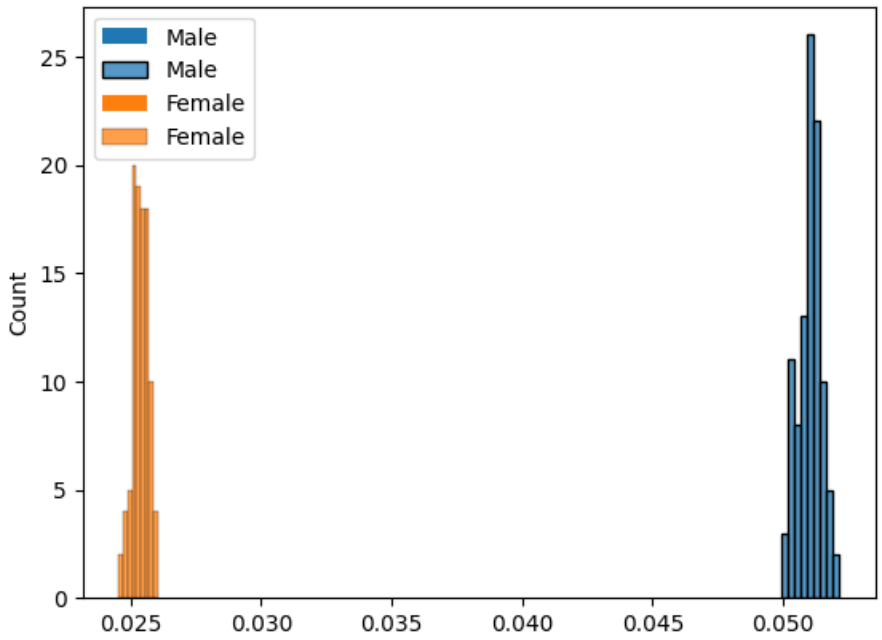
4.) Balochistan 0.027

This is more than found in the years 2018-19 however lesser than 2019-2020.

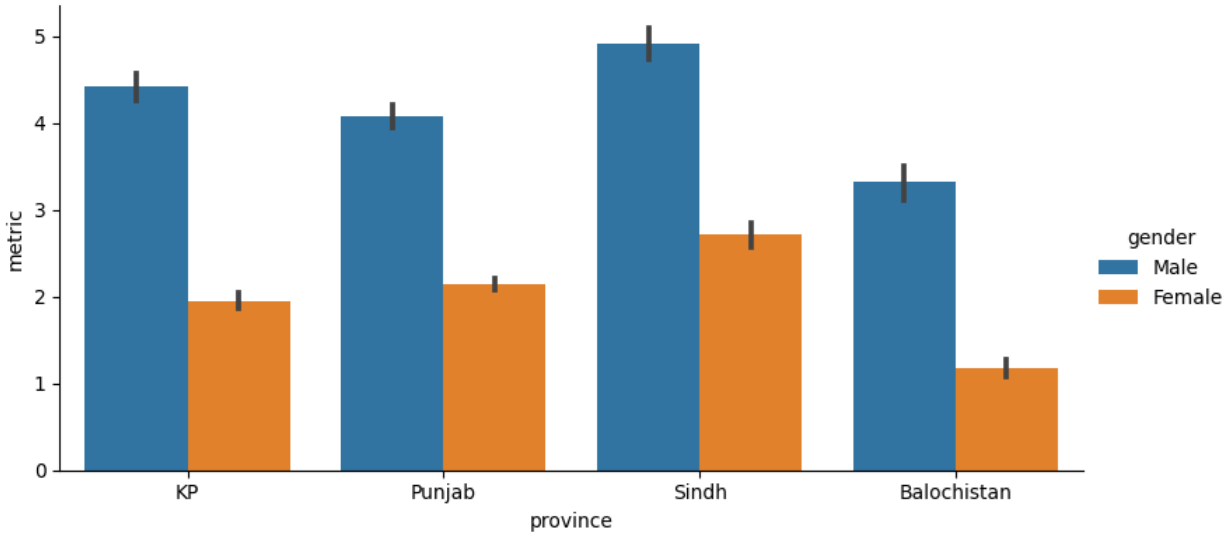
Gender Average metric comparison:



The average metric for males is 0.051 while for females it is 0.025 (half). The difference is extremely statistically significant as shown below.

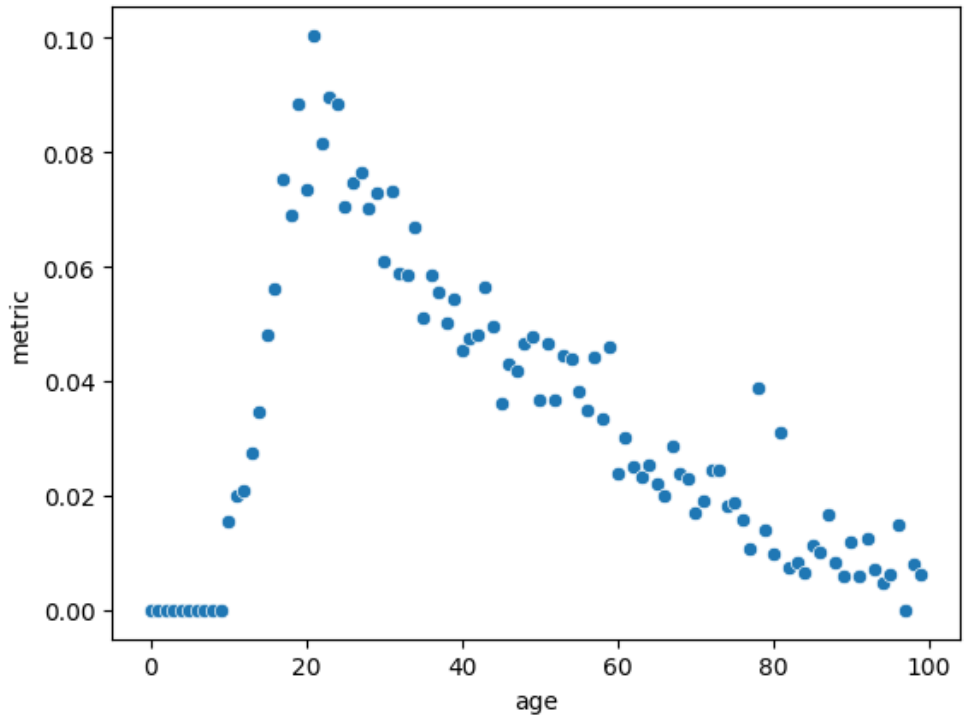


Provincial-Gender comparison:



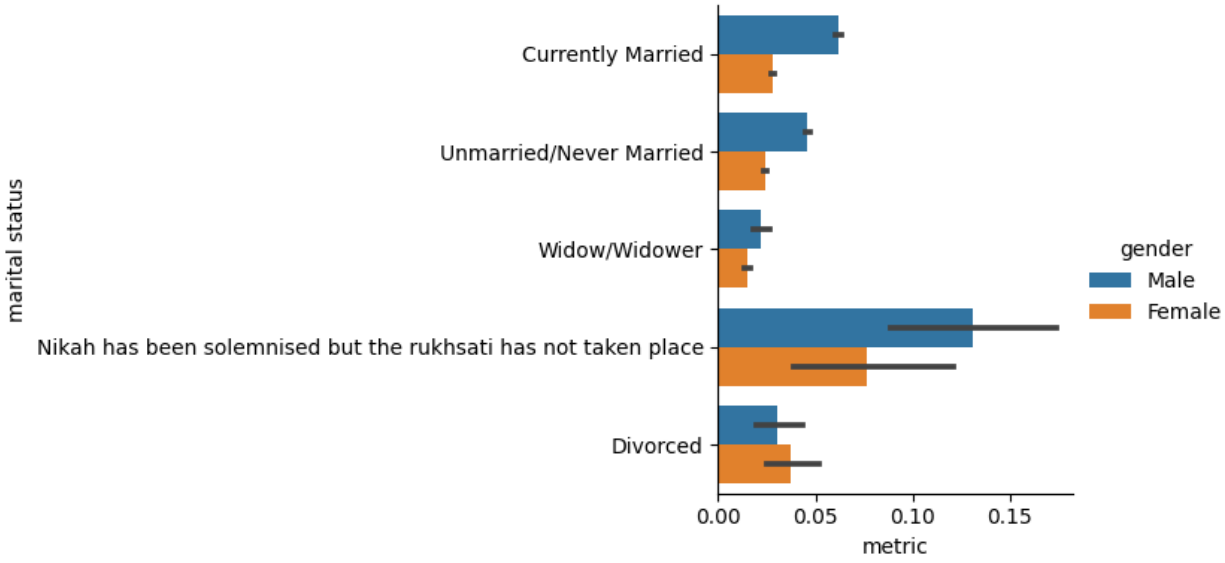
Male and female metric disparity in all provinces (2x metric for males than females). The disparity is greatest in KP and Balochistan. Male metric ranking is same as the overall metric ranking however in case of females position of KP and Punjab is swapped.

Metric-Age distribution:



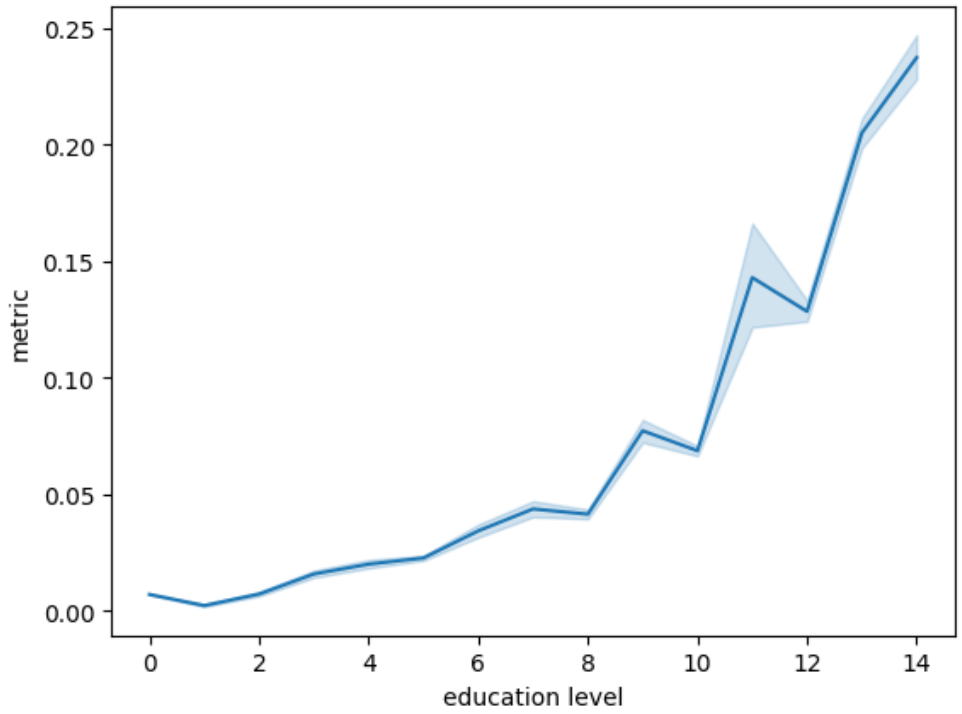
This graph shows a sharp linear increase up to 21 years of age and then a slower linear decrease after that.

Metric-Marital Status Comparison:



Males have 2x metric as females in the categories currently married, never married, and nikkahfied. The disparity is significantly lesser in the other categories, especially in the divorced category where it's not even statistically significant.

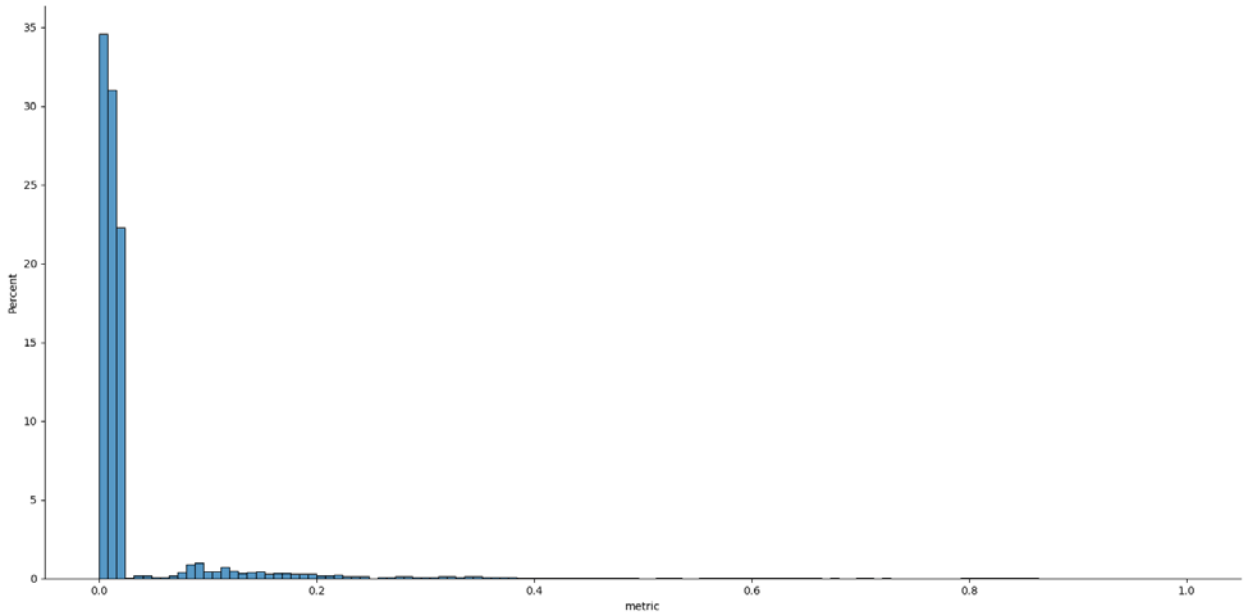
Metric-Education level:



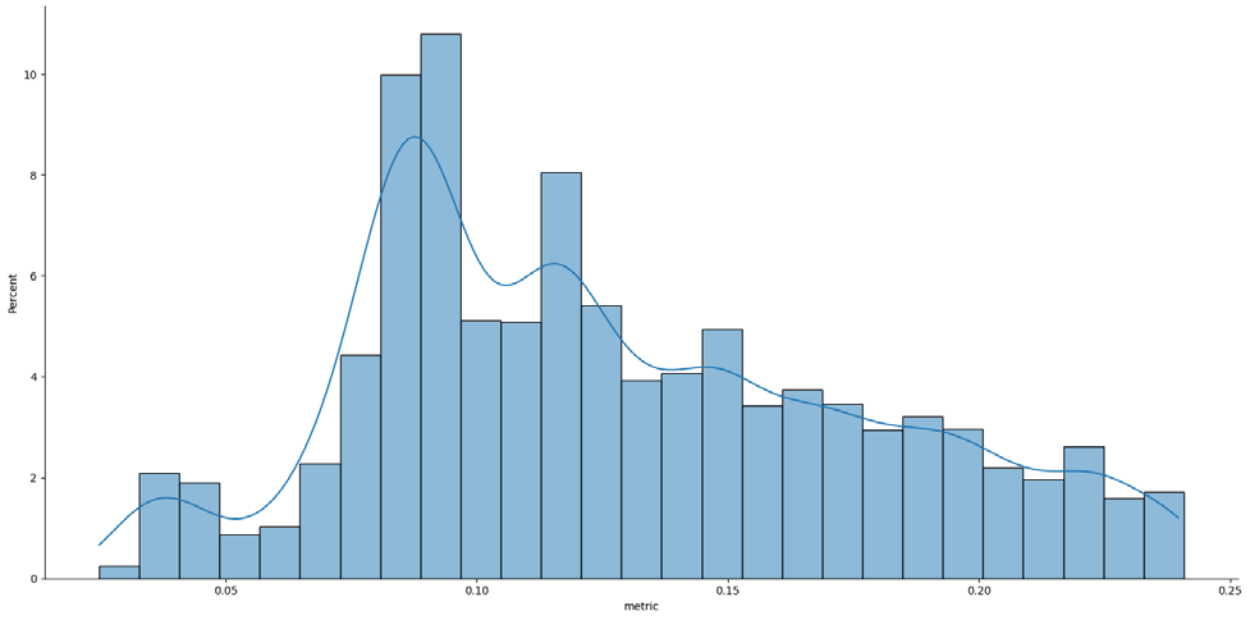
The metric increases exponentially with education level.

2018-19:

ICT metric distribution:

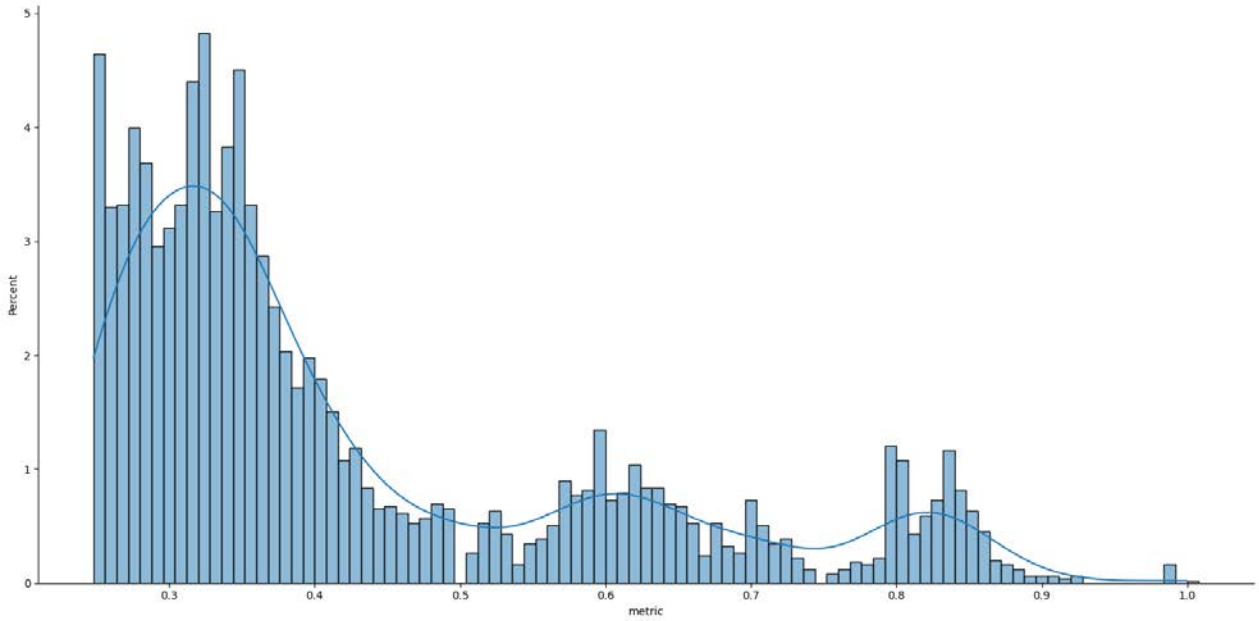


97% of the data has metric < 0.24. 9% of that lies between 0.024 and 0.24 with this distribution:



The distribution has a peak at 0.9 after which is linearly falls off.

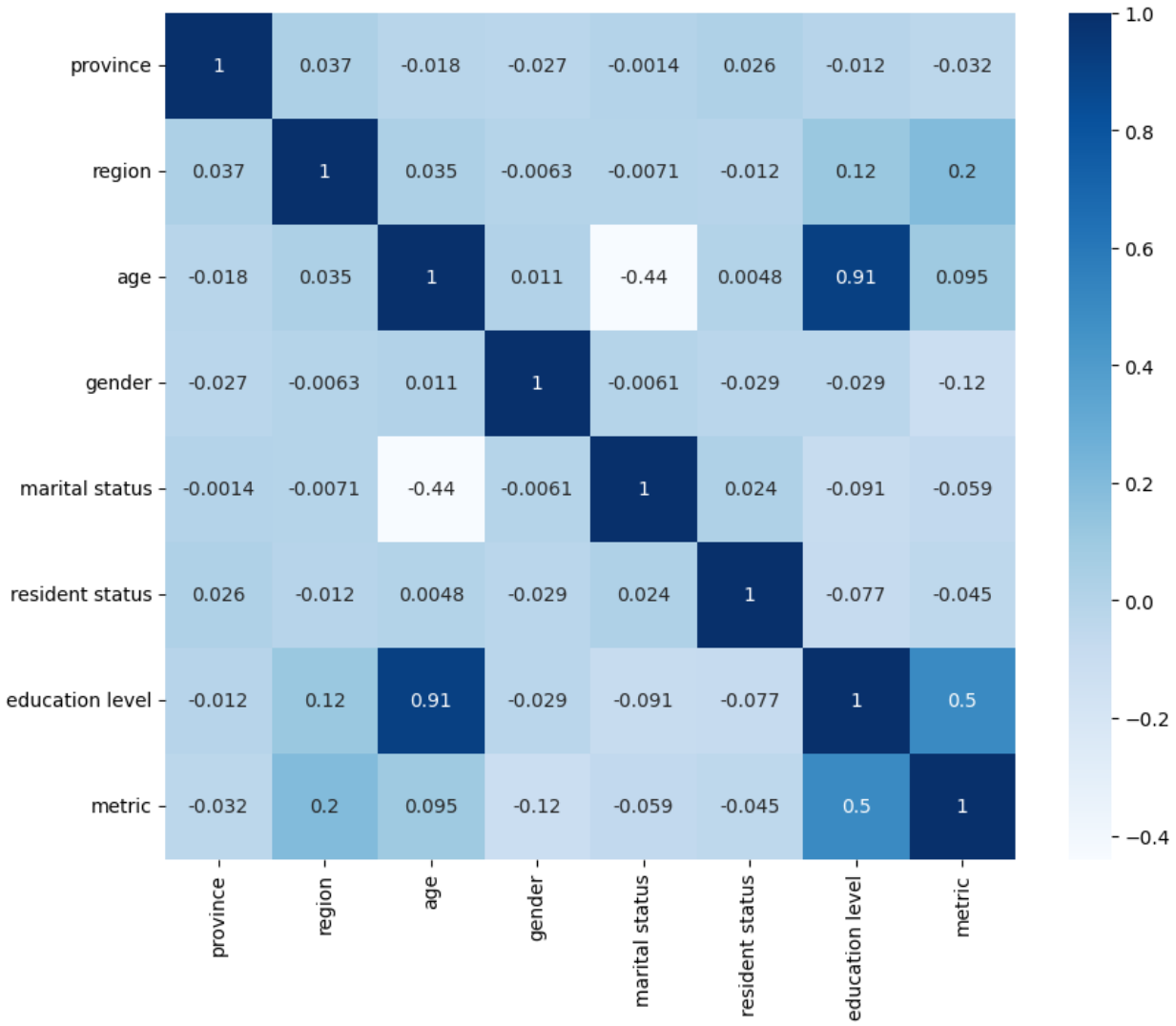
After 0.24 this is the distribution:



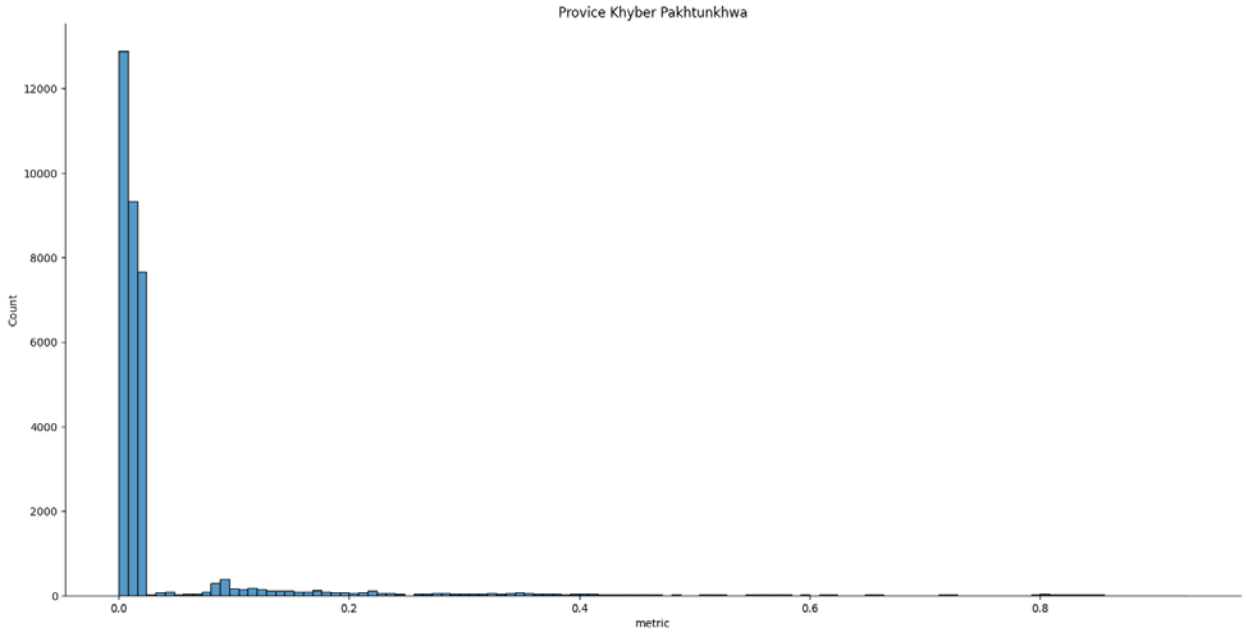
Decaying peaks at 0.31, 0.61 and 0.82.

Spatial Distribution:

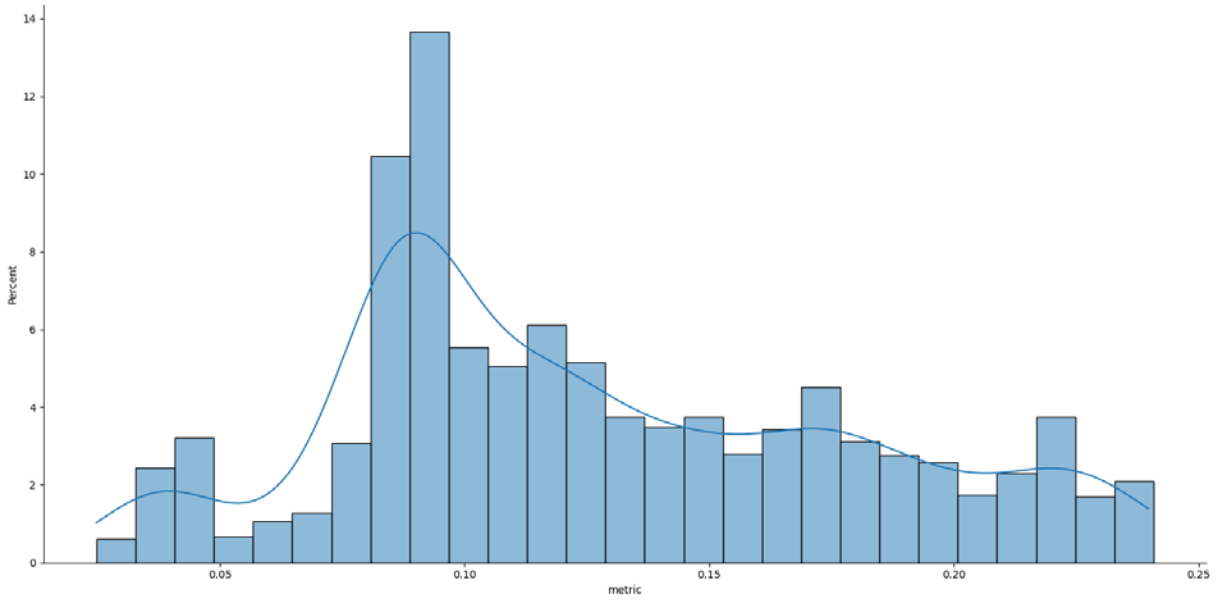
Correlation heatmap:



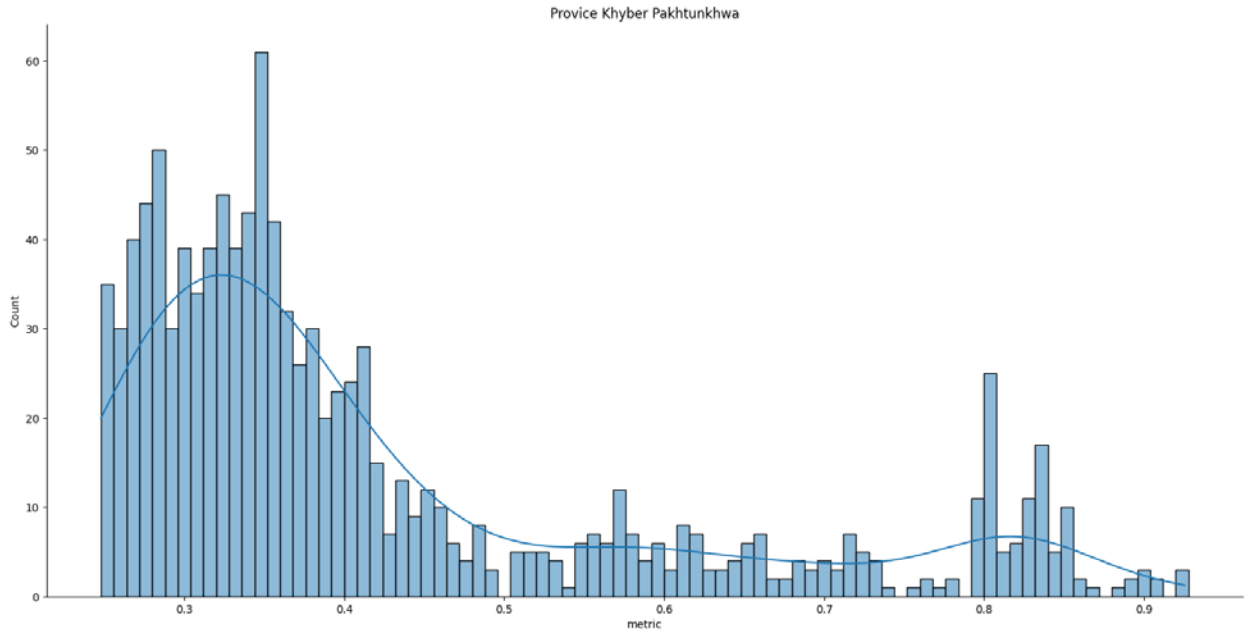
Distribution for KPK:



97% of the data has metric < 0.24 of which 88% has metric between 0.024 and 0.24, with the following distribution:

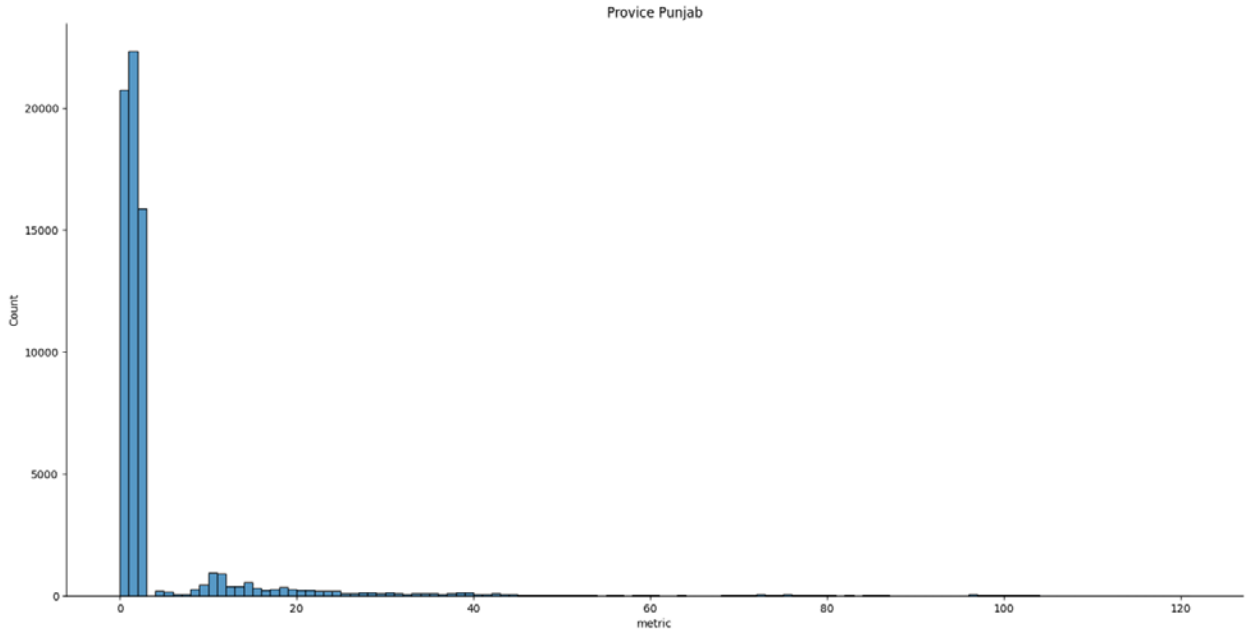


The rest has this distribution:

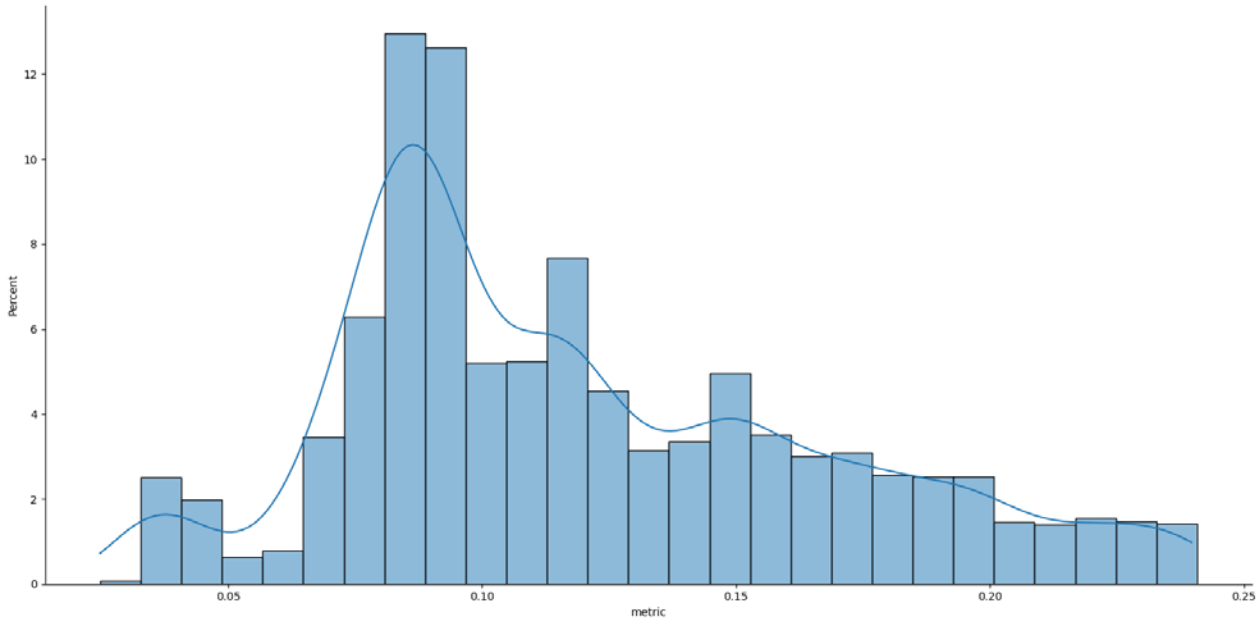


A peak around 0.32 and then a smaller peak at 0.82.

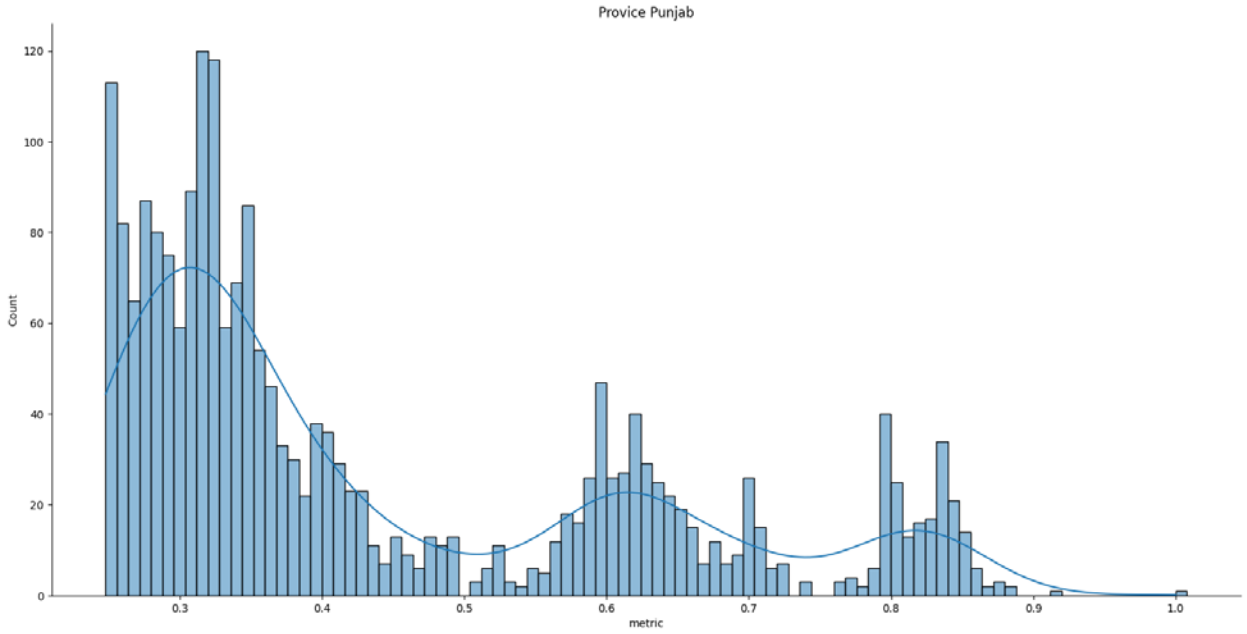
Distribution for Punjab:



86% of the data has metric < 0.24 and 76% has metric between 0.024 and 0.24 with the following distribution:

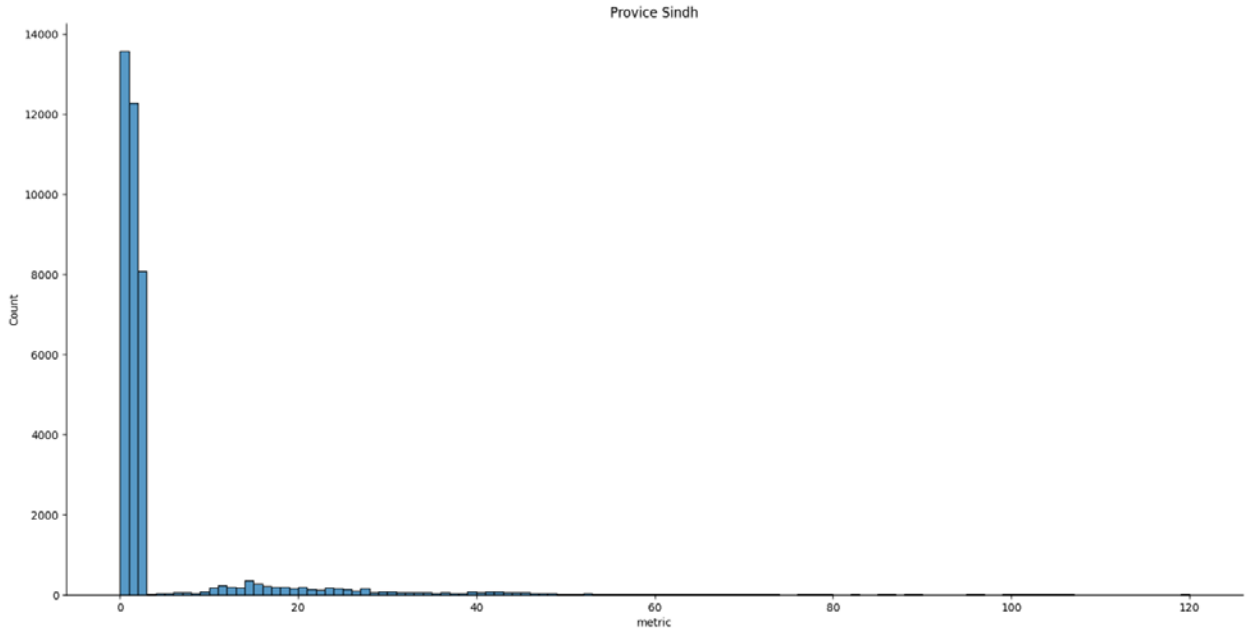


This is a triangular distribution with a peak at 0.8 and a fall off to 0.24. The data with metric > 0.24 has the following distribution:

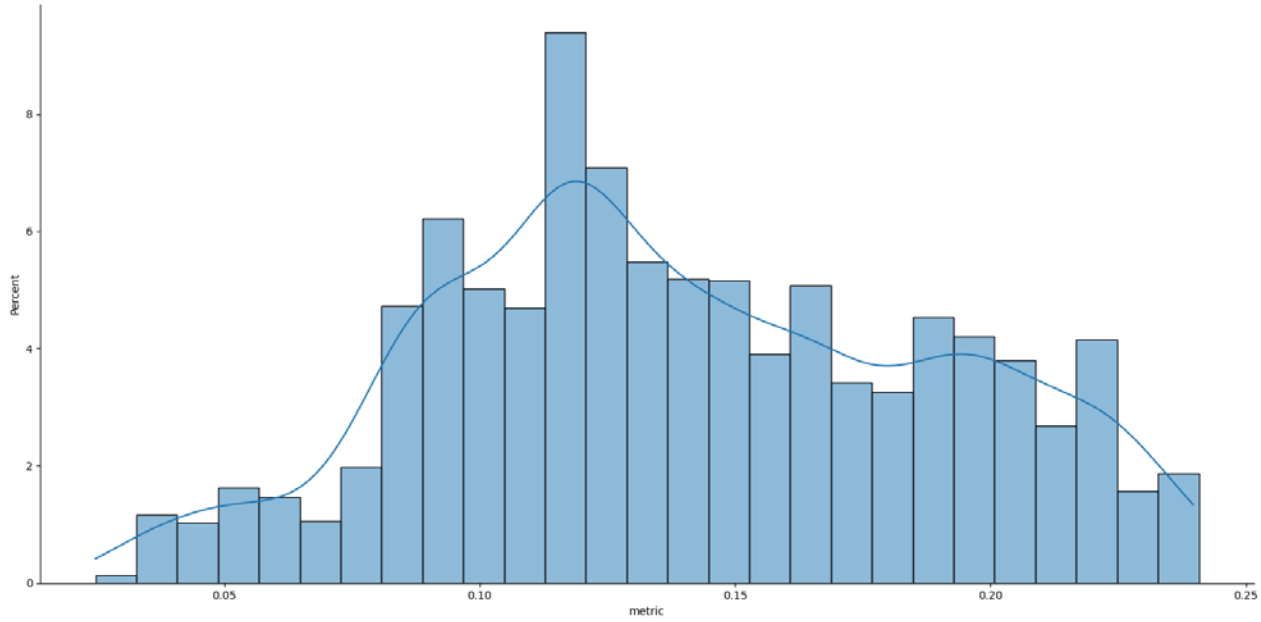


3 decaying peaks at 0.3, 0.62 and 0.82.

Distribution for Sindh:

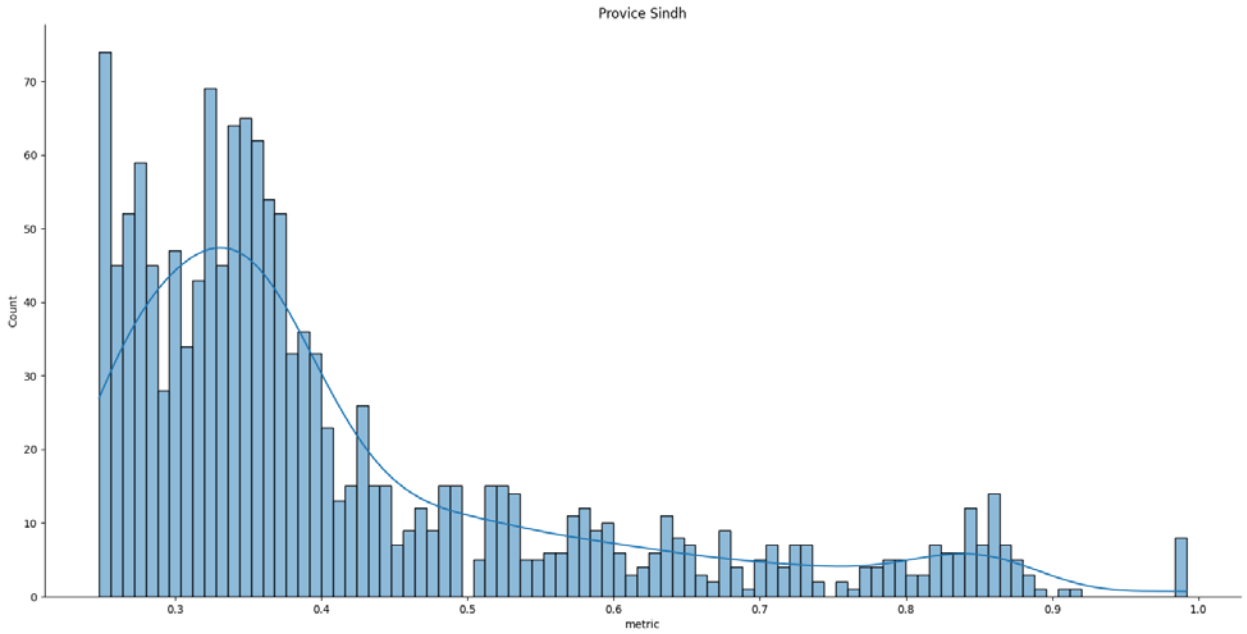


96% of data has metric < 0.24 and 87% of data with metric < 0.024. Data with metric between 0.024 and 0.24 is distributed as follows:



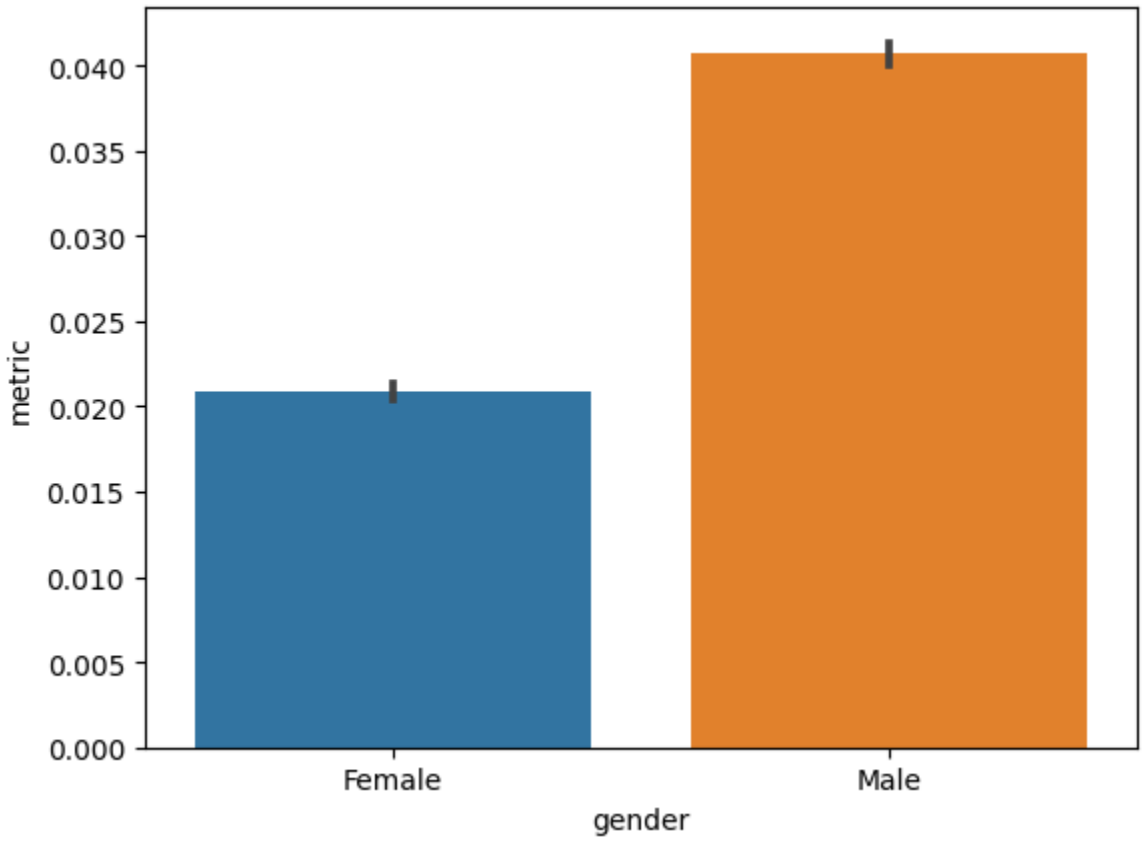
It peaks at 0.12 and then drops off.

The data after 0.24 has this distribution:

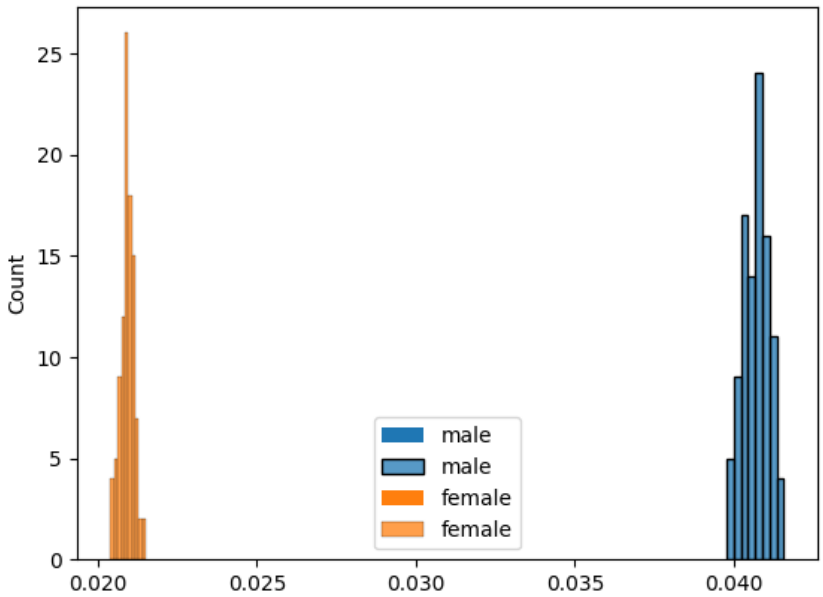


Peaks at 0.34 and then drops till 1.0.

Gender Average metric comparison:

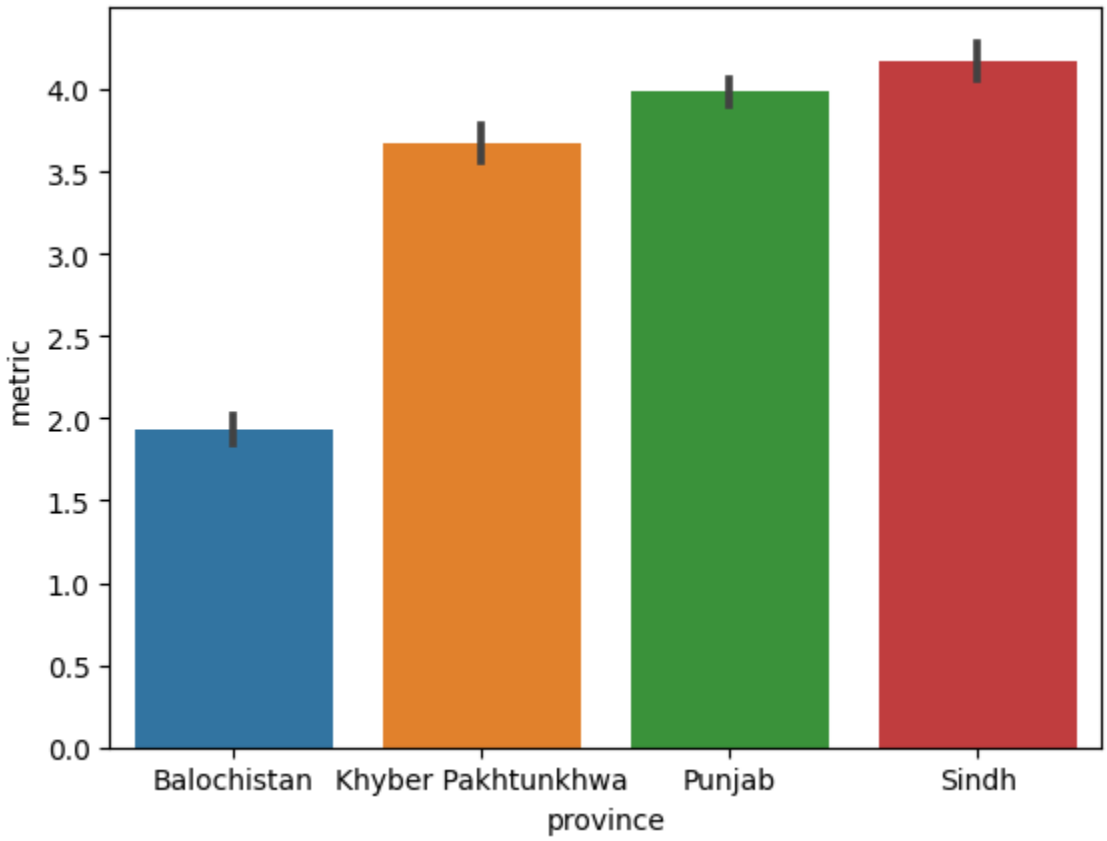


The average metric for males is 0.041 while for females it is 0.021 (nearly half). The difference is extremely statistically significant as shown below.



Both the means are lower than the 2019 means.

Provincial Average metric comparison:



Provincial comparison shows sindh and punjab have highest average metric among all provinces with a close tie. Errors bars of 95% significance level show no overlap between any province however, KPK, Sindh and Punjab are are very close unlike 2019 where only sindh and Punjab were close.

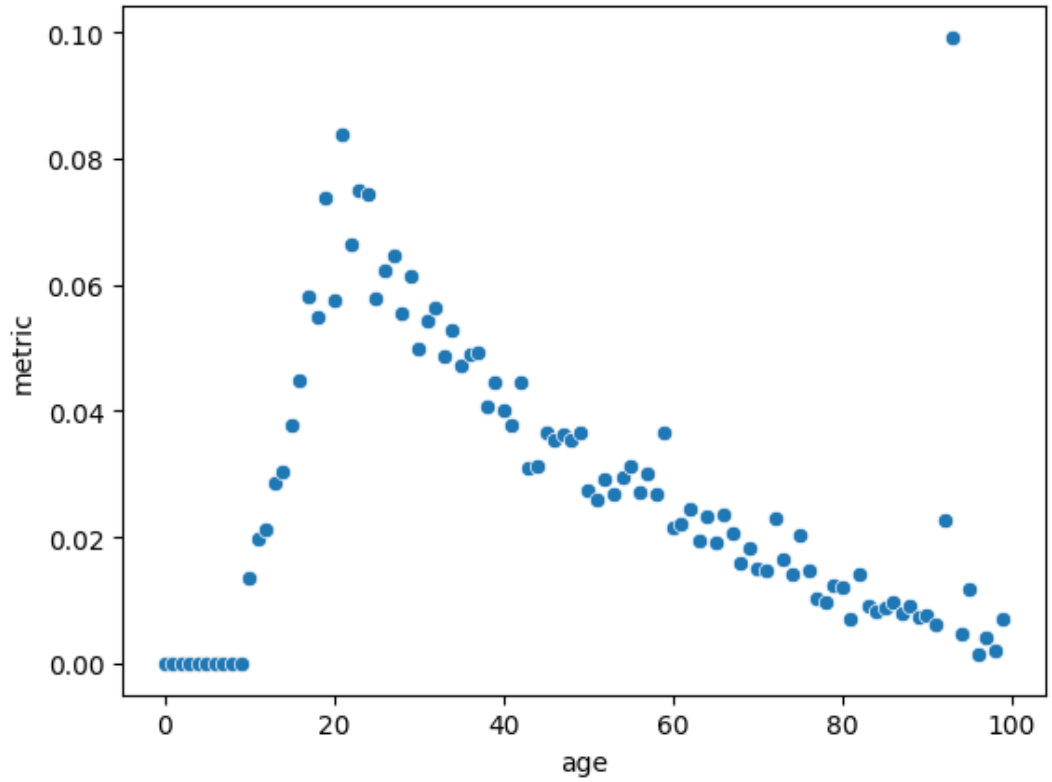
The average metric for balochistan is atleast 2 times lesser than others.

1. Sindh 0.034
2. Punjab 0.033
3. KPK 0.030
4. Balochistan 0.016

Provincial-Gender comparison:

Provincial gender comparison shows similar pattern as the general one. Male and female metric disparity (~2x) in all provinces highest in KPK this time no clear winner among others. Sindh, Punjab and KPK all have overlaps in error bars of males but balochistan is almost half their metric. The difference between males and females in greatest in KPK (2.4x) and least in Punjab and Sindh (1.8x).

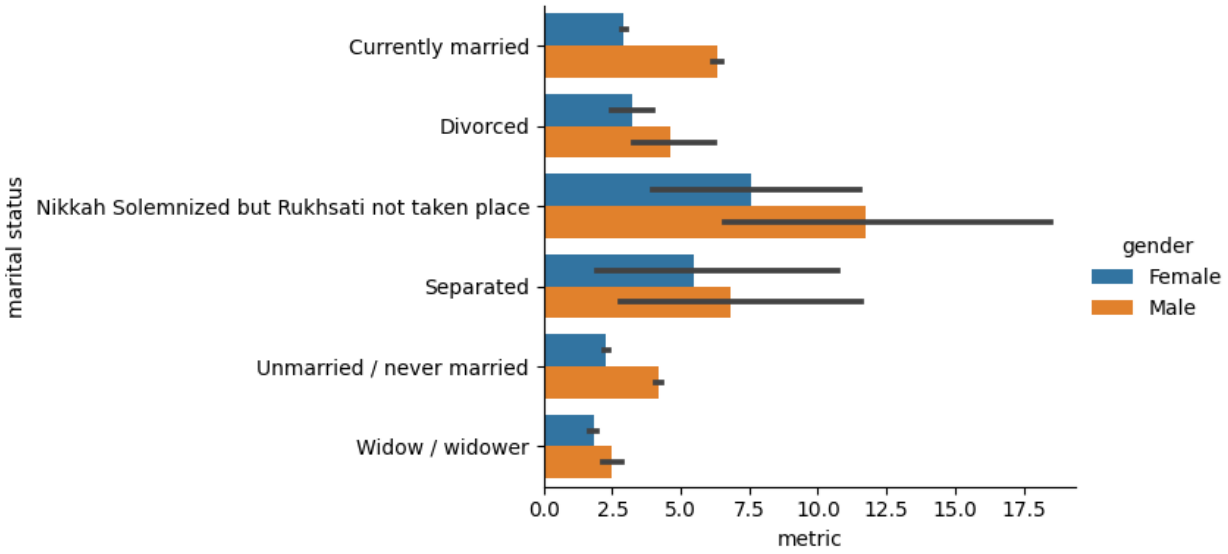
Age-metric graph:



This shows a exponential increase in metric with age upto the age of 22 after which is starts to drop linearly. This pattern is kind of expected because modern generation starts to learn more about technology as they age and after the 22 part contains people of the older generation who is less well versed with technology the older they are.

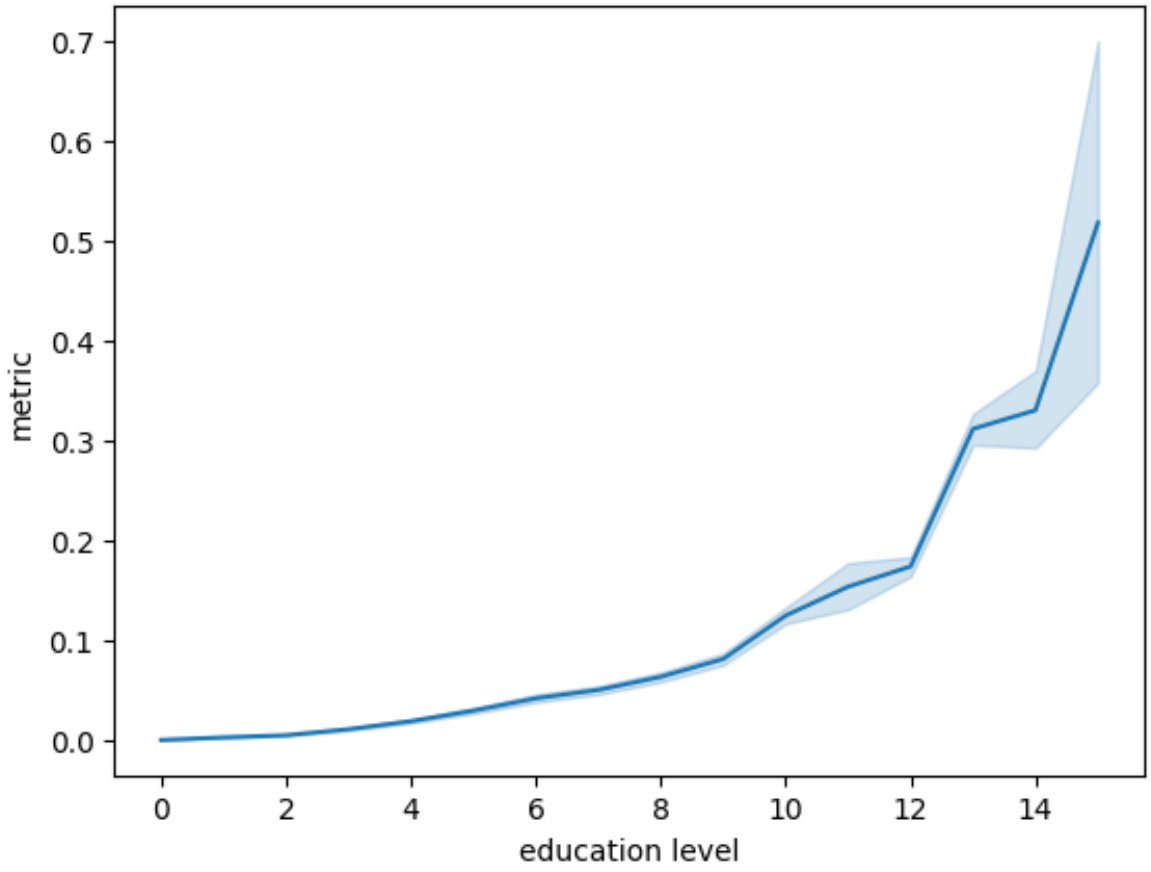
Another thing to note is that the graph is shifted to 1 year less as compared to 2019 which is expected since this data is from 2018.

Marital Status – metric graph:



Males have 2x metric as females in the categories currently married, never married, and nikkahfied. The disparity is significantly lesser in the other categories, especially in the separated category where its not even statistically significant.

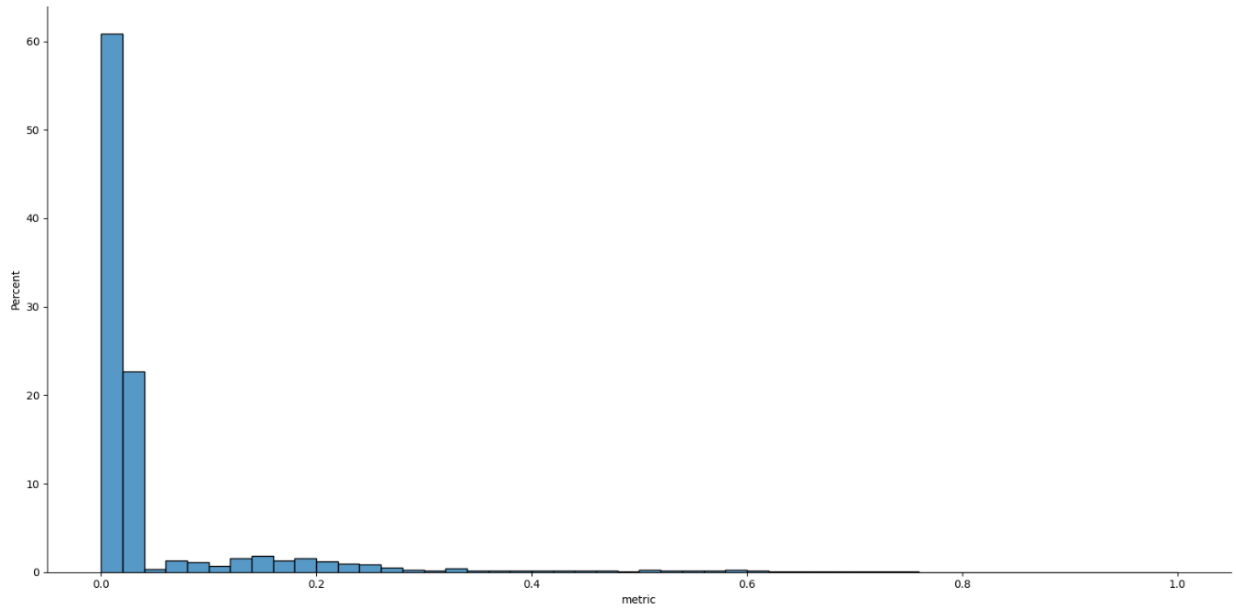
Education level – metric graph:



This plot shows statistically significant exponential growth of metric as education level of individual increases.

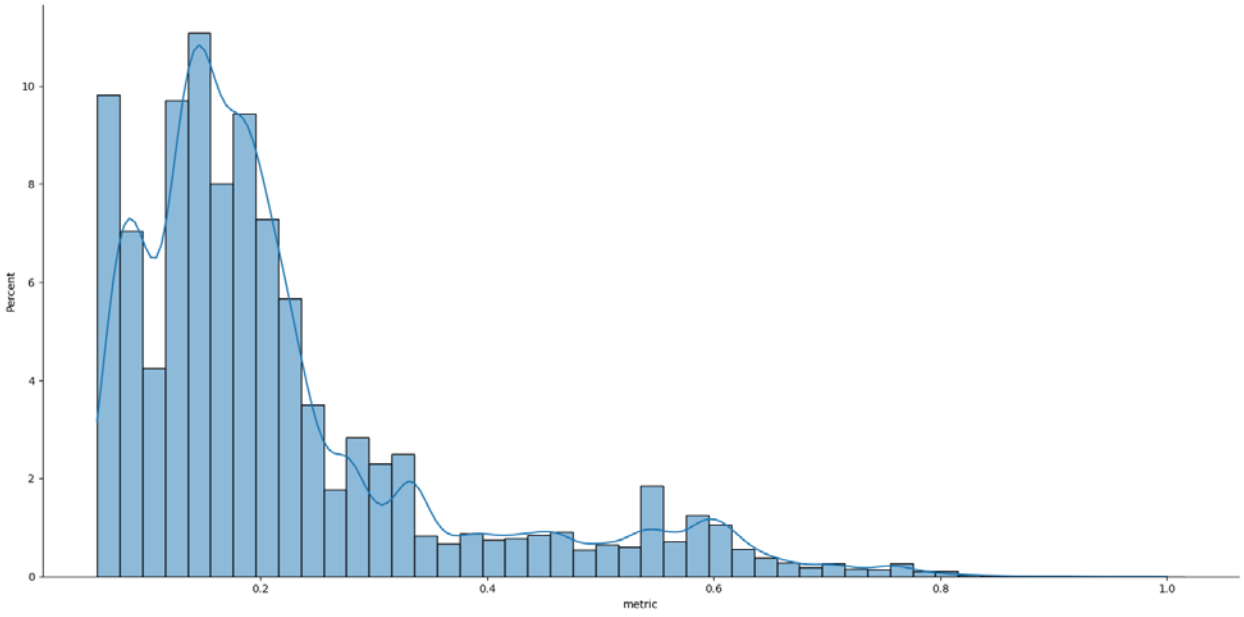
2019-2020:

ICT Metric Distribution:



As is visible most of the data (93.3 %) lies below a metric value of 0.2.

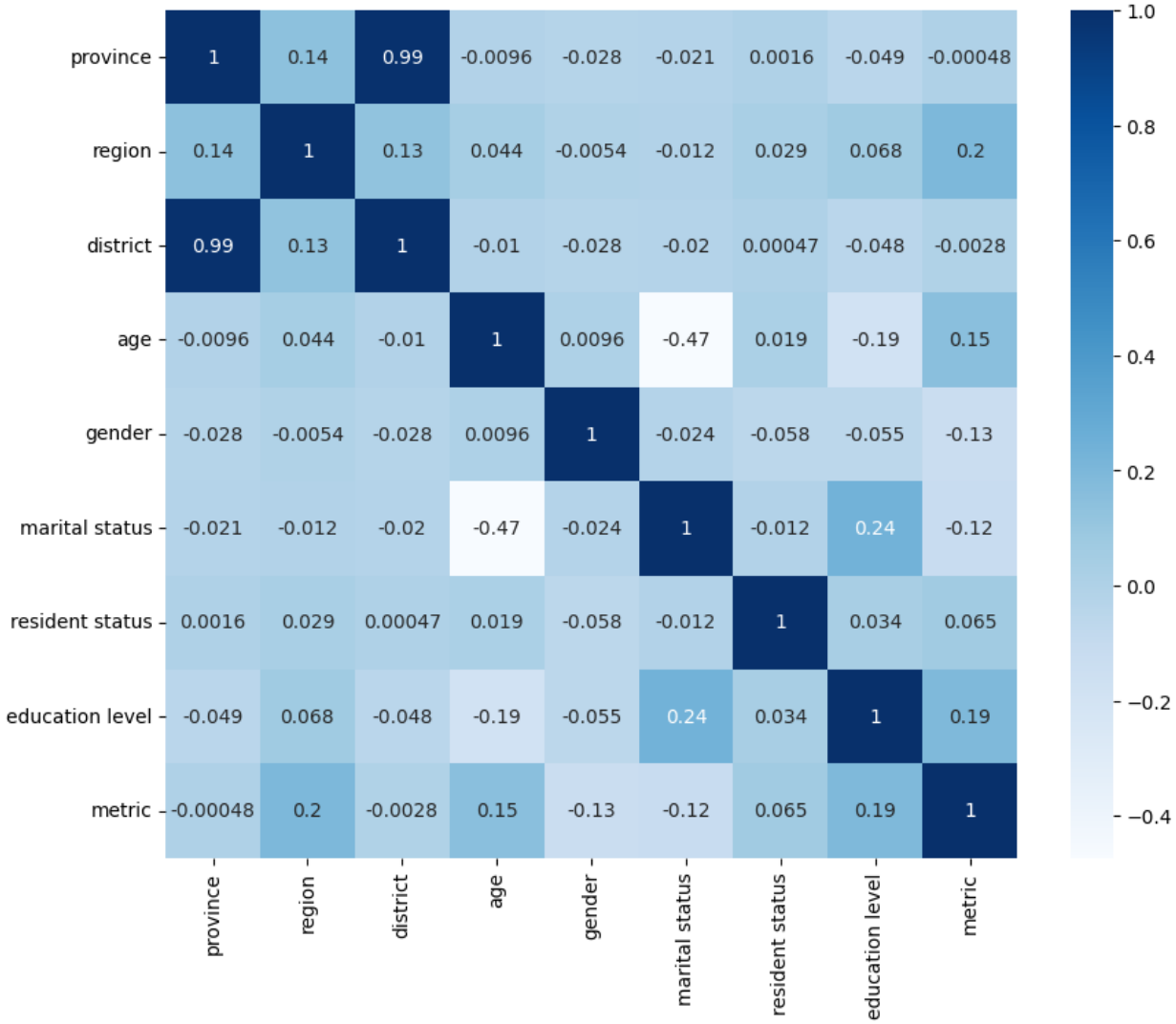
83.5% of the data has metric < 0.02. While the rest has the following distribution:



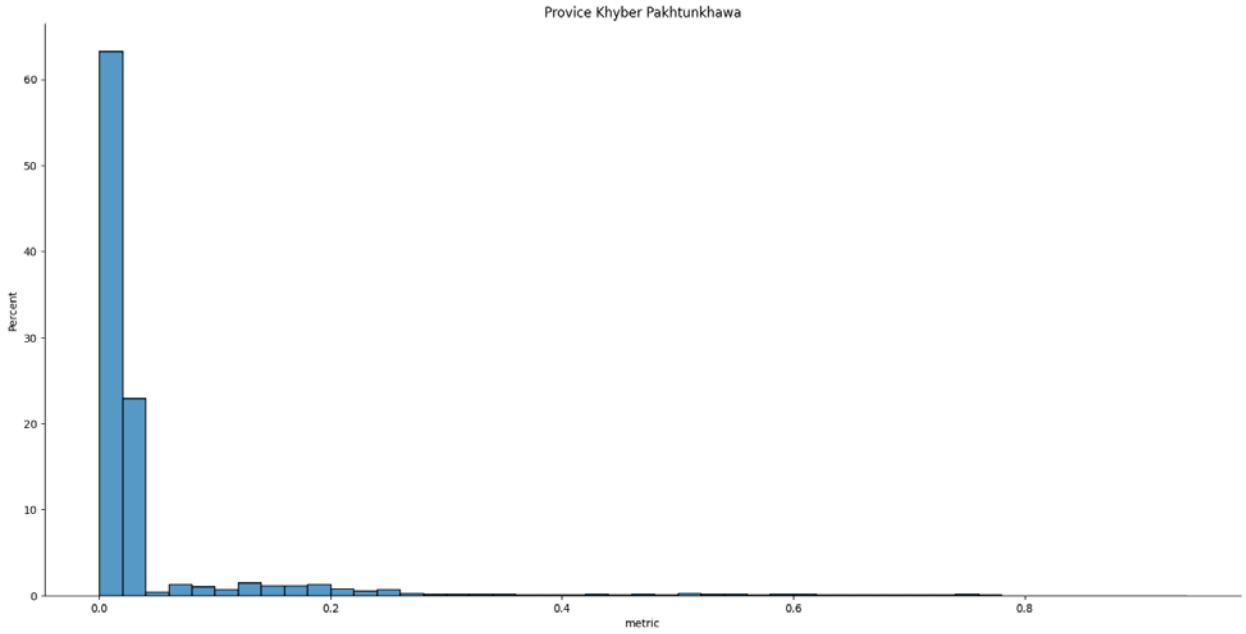
Peaks at 0.18 then drops off fast.

Spatial Distribution:

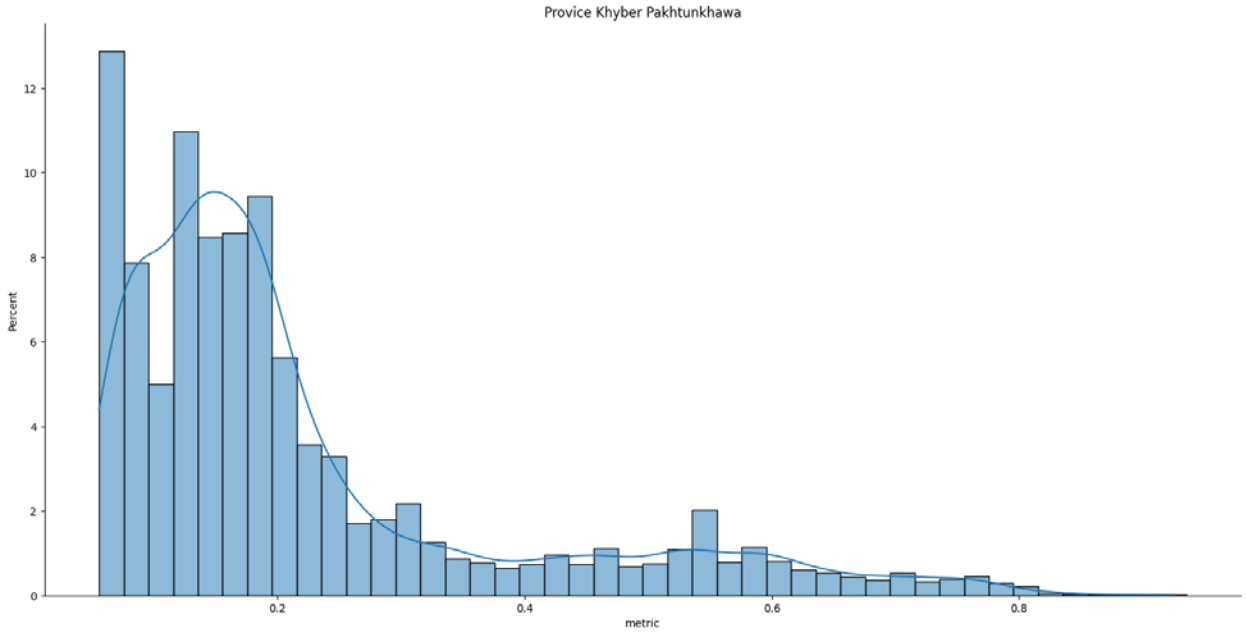
Demographic Correlation Heatmap:



Distribution for KPK:

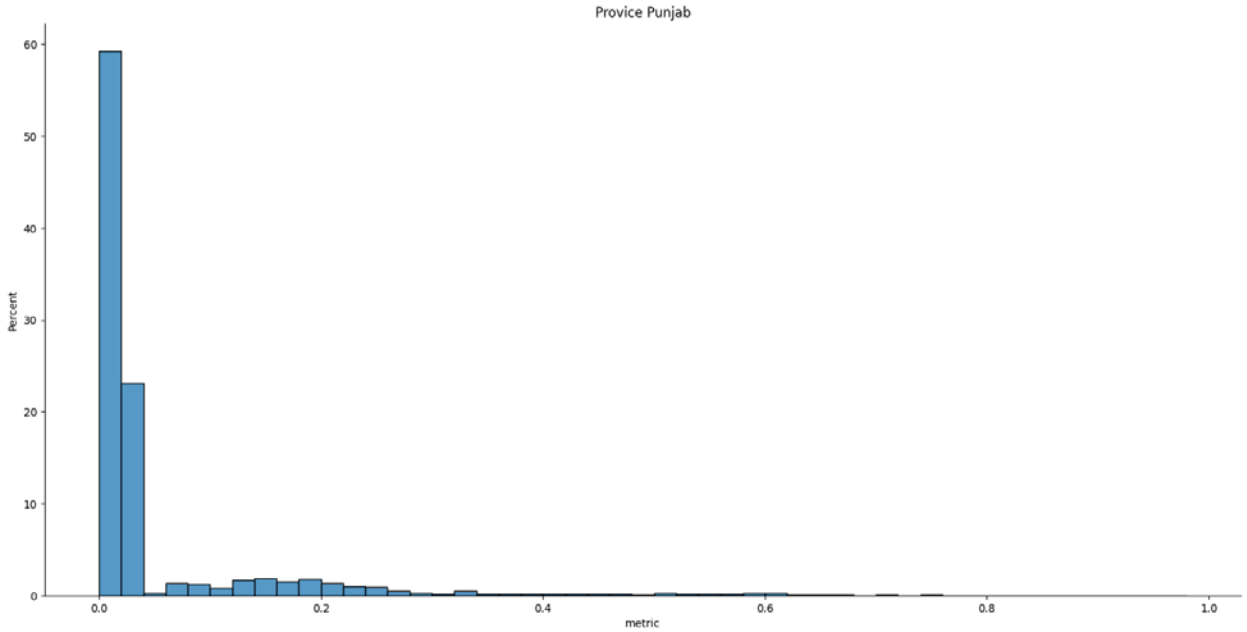


86.2% of the data has metric < 0.04. The rest is distributed as follows:

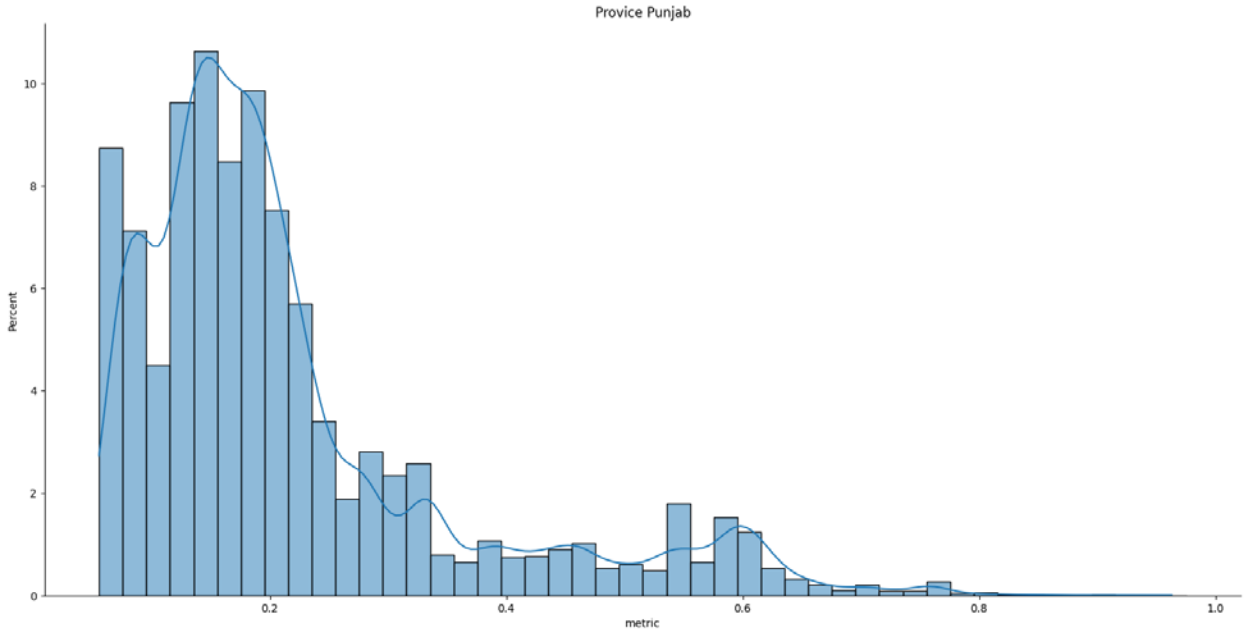


Peaks at 0.16 them drops off to a constant value till 0.6. Then drops to a smaller constant value before disappearing at 0.8.

Distribution of Punjab:

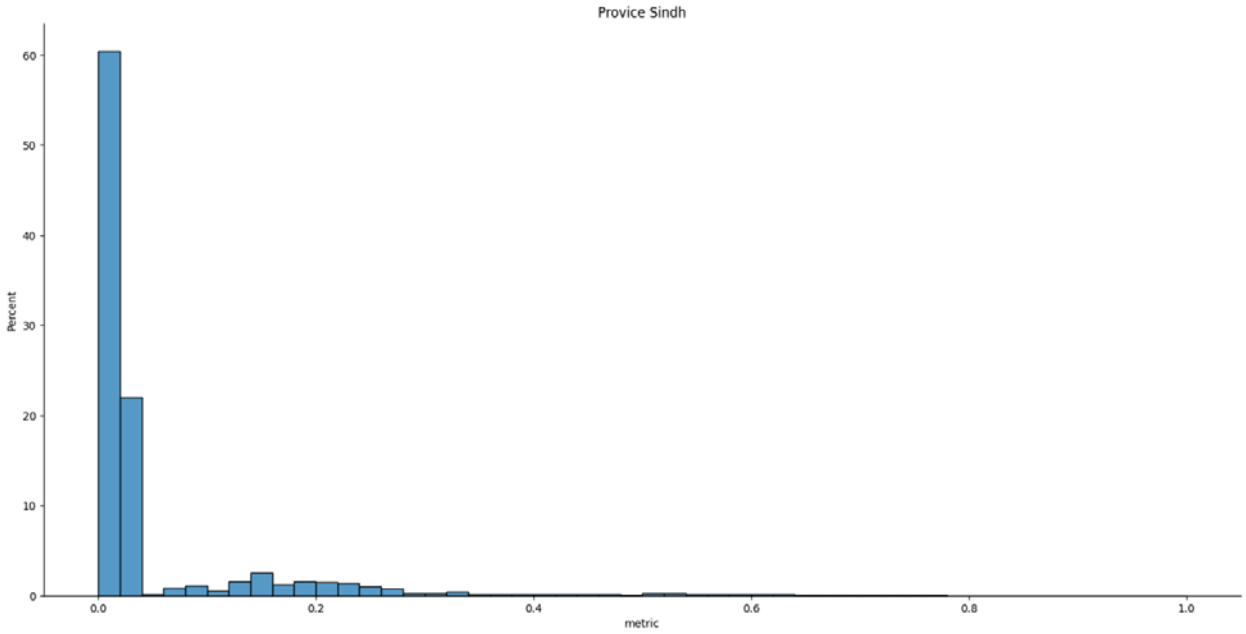


82.4% of data has metric < 0.04. The rest is distributed as follows:

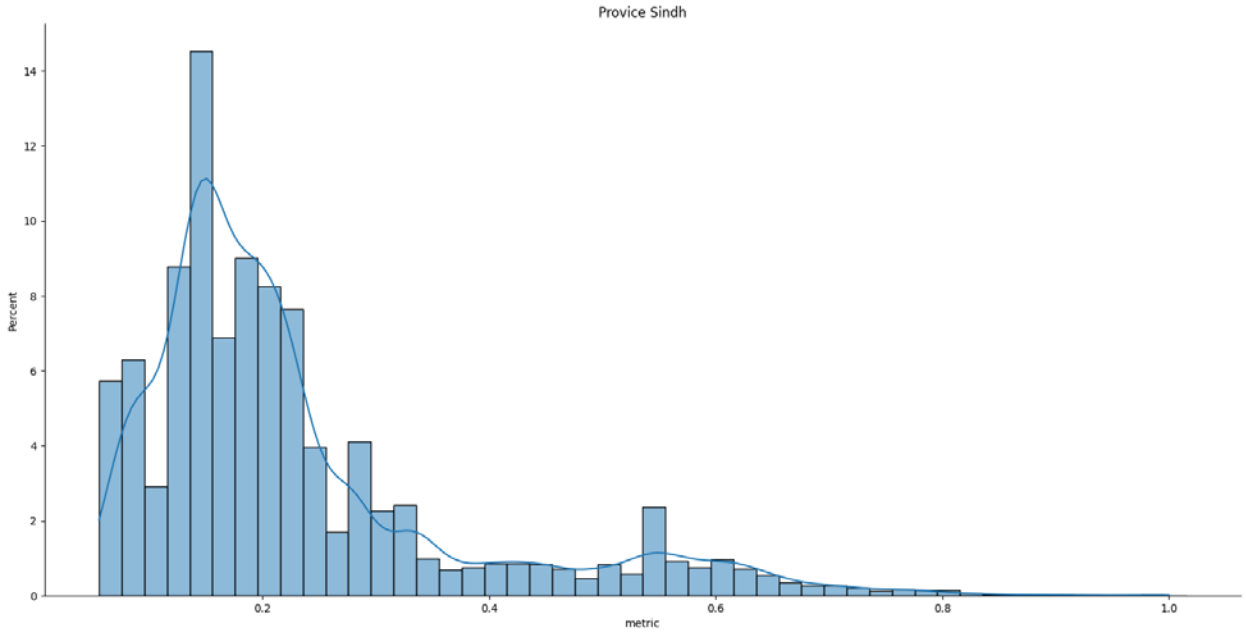


One peak at 0.16, drop off after that and then another small peak at 0.6.

Distribution for Sindh:

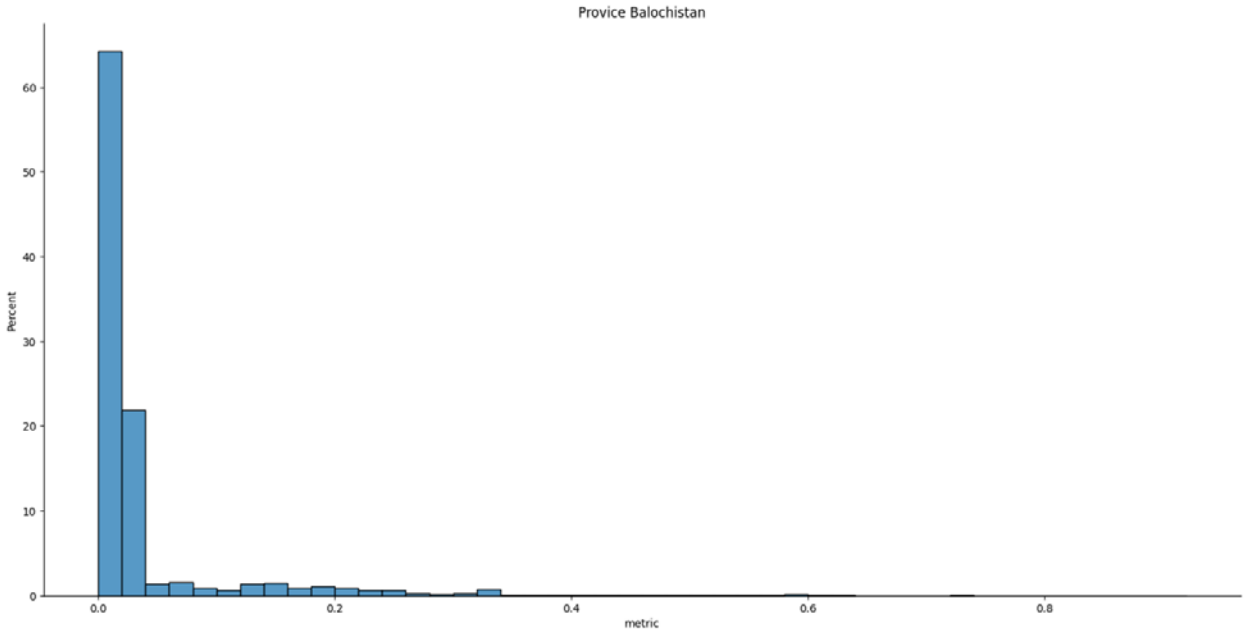


82.4% of data with metric < 0.04. The rest is distributed as follows:

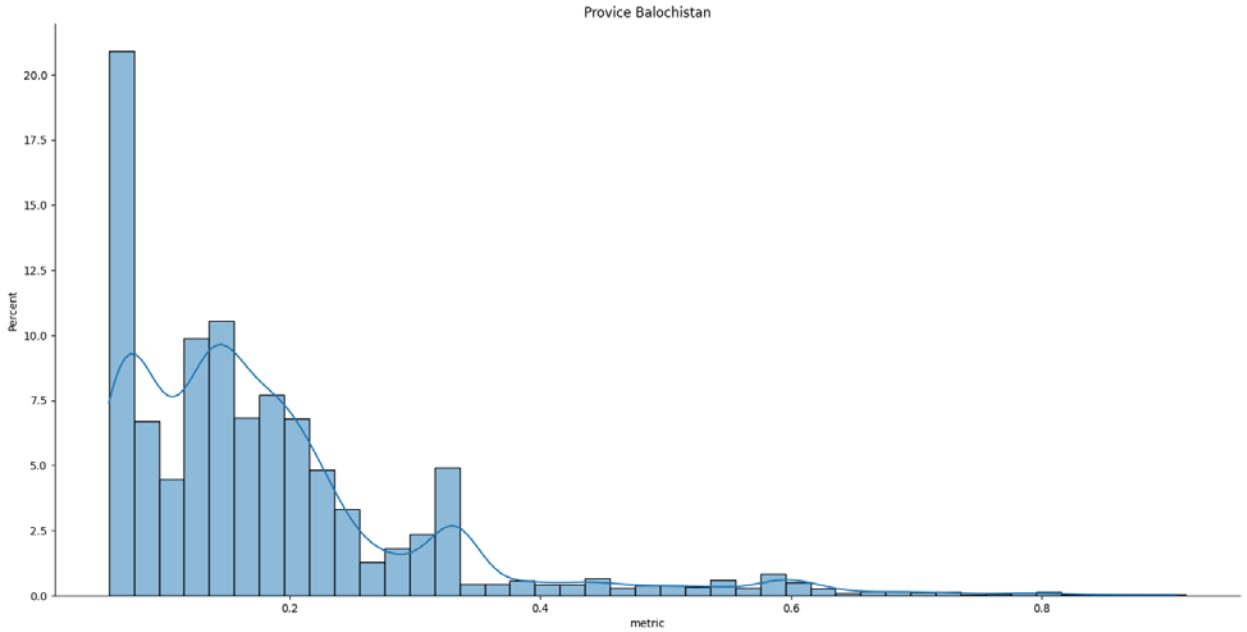


A peak at 0.16 and then another small peak at around 0.6.

Distribution for balochistan:

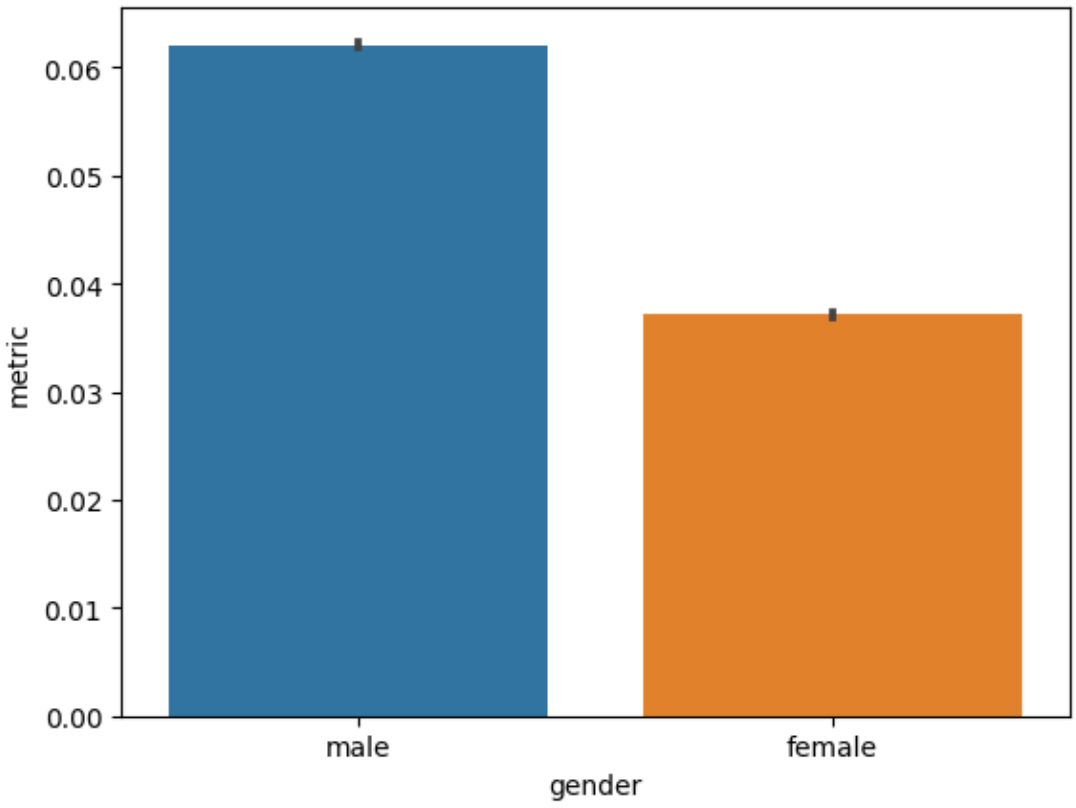


86.1% of data with metric < 0.04 (highest). The rest is distributed as follows:

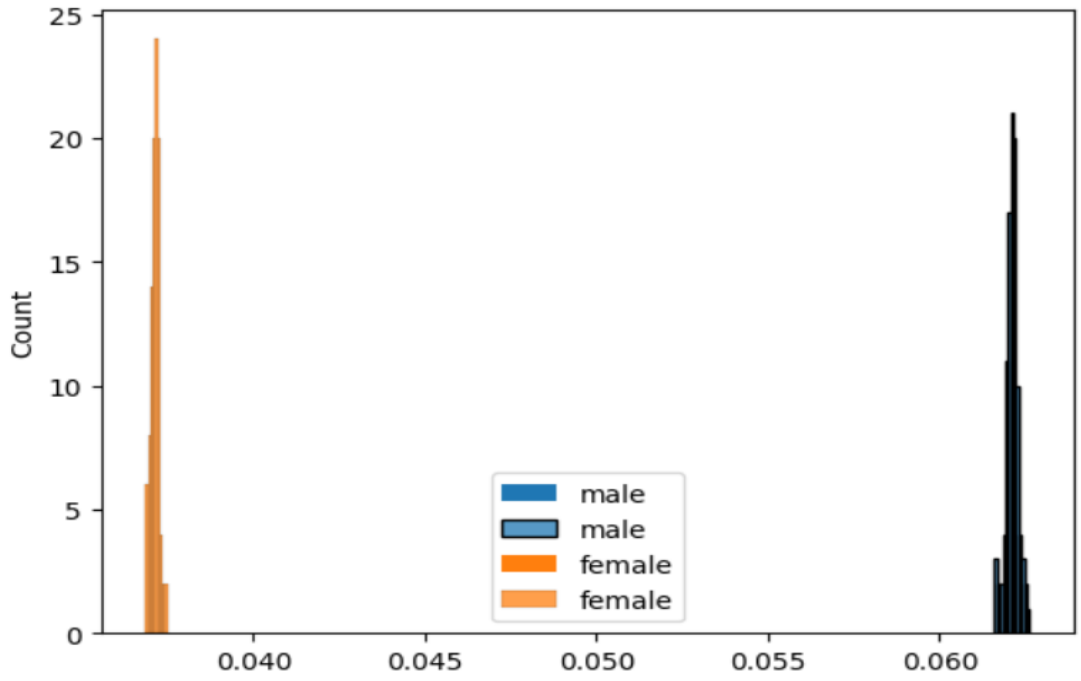


A peak at 0.16 then another small peak at 0.32 (lowest).

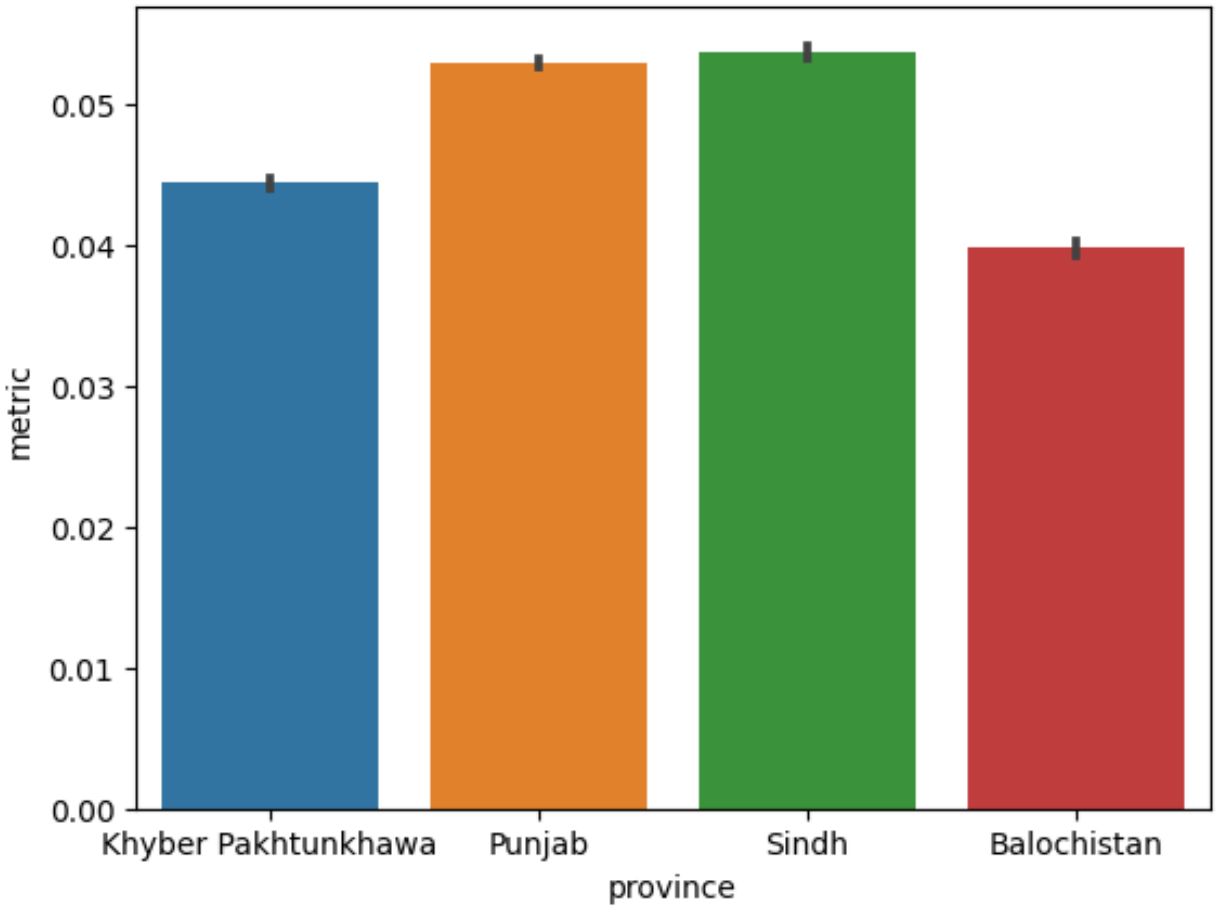
Gender-metric comparison:



The average metric for males is 0.062 while for females it is 0.037 (nearly half). The difference is extremely statistically significant as shown below.



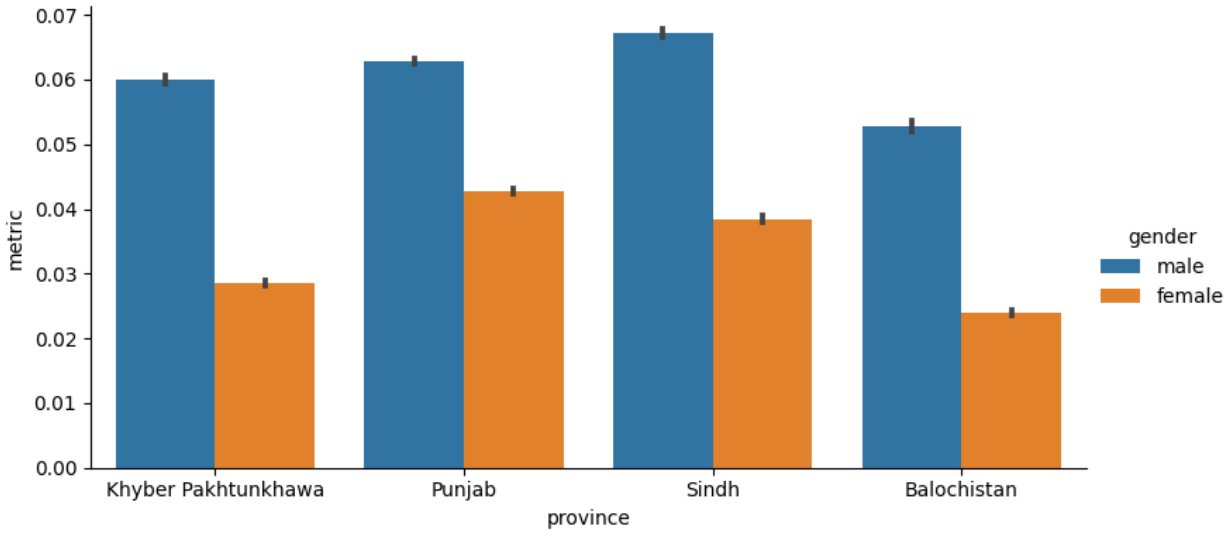
Province average metric comparison:



Provincial comparison shows sindh and punjab have highest average metric among all provinces with a close tie. Errors bars of 95% significance level show have overlap between sindh and punjab but none between KPK and balochistan so KPK and balochistan have highly statistically significant difference to sindh and punjab and each other.

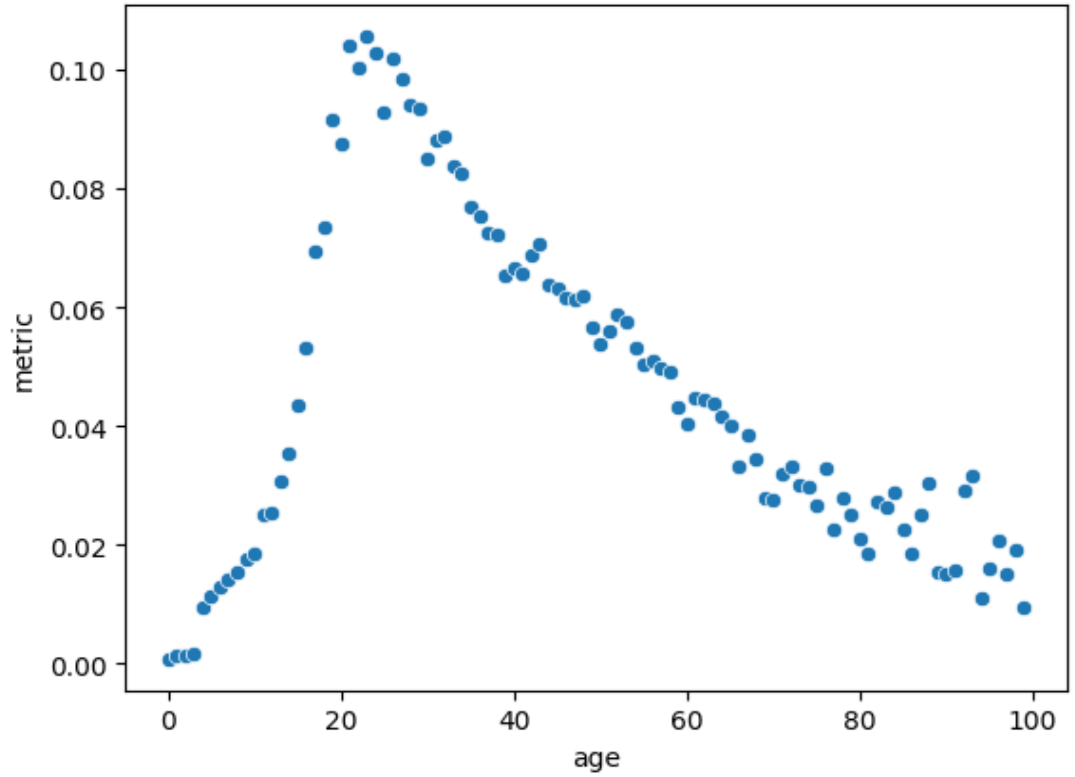
1. Sindh 0.054
2. Punjab 0.053
3. KPK 0.044
4. Balochistan 0.040

Provincial-Gender comparison:



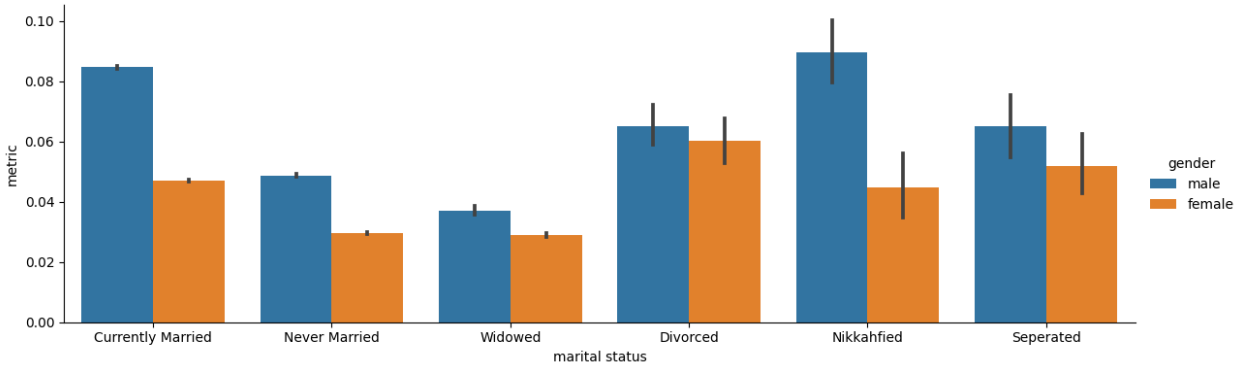
Provincial gender comparison shows similar pattern as the general one. Male and female metric disparity in all provinces (almost 2x for males except in punjab where it is least). Sindh and Punjab close at top in males followed by KPK and balochistan. For females punjab at top followed by Sindh.

Age-metric Comparison:



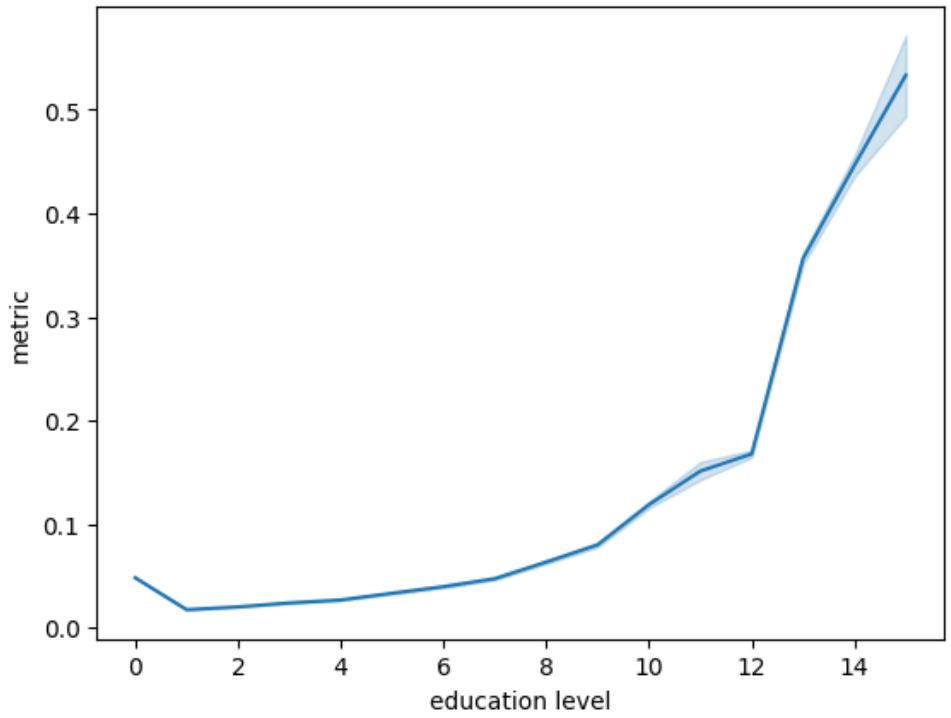
This shows an exponential increase in metric with age up to the age of 23 after which is starts to drop linearly. This pattern is kind of expected because modern generation starts to learn more about technology as they age and after the 23 part contains people of the older generation who are less well versed with technology the older they are.

Marital Status metric comparison:



Males have 2x metric as females in the categories currently married, never married, and nikkahfied. The disparity is lesser in the other categories, especially in the divorced categories where it's not even statistically significant.

Education level-metric comparison:



The plot shows an exponential increase of average metric with education level.