finalScore

- **dataScore**
  - 5g_uptime
  - fiveg_usage_percentage
  - data_usage
- **networkSpeedScore**
  - uploadresult
  - downloadresult
  - latency
- **networkSignalScore**
  - RSRP
  - CQI
  - SNR
- **networkFailureScore**
  - LTERACHFailurePercentage
  - LTEHandOverFailurePercentage
  - NRSCGChangeFailurePercentage
- **deviceScore**
  - switch_count_sum
  - percentageReceived
  - reset_count
  - MemoryPercentFree

Introduction:

This document outlines the data structure for our 5G Home Score analysis, which assesses 5G Home WiFi performance by integrating customer-related data from multiple tables (Figure 1).

The goal is to develop a scoring mechanism that combines weighted features to indicate overall WiFi performance."
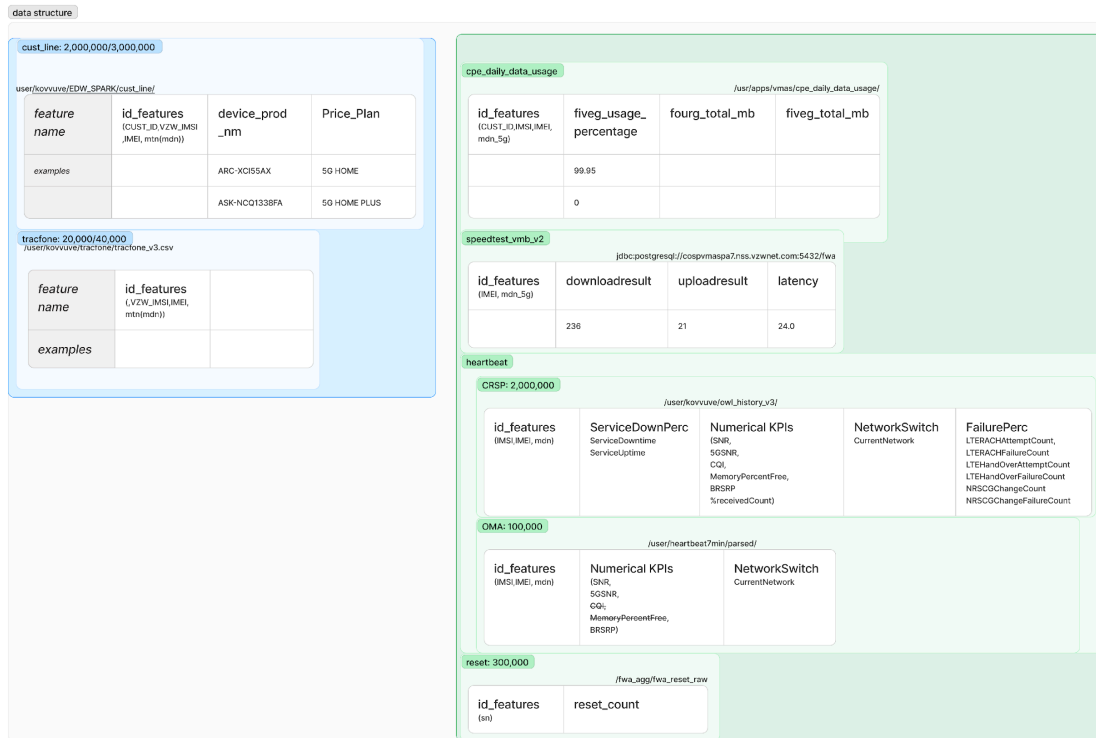
data structure

cust_line: 2,000,000/3,000,000

user/kovvuve/EDW_SPARK/cust_line/

feature name	id_features {CUST_ID,VZW_IMSI ,IMEI, mtn(mdn)}	device_prod _nm	Price_Plan
examples		ARC-XCI55AX	5G HOME
		ASK-NCQ1338FA	5G HOME PLUS

tracfone: 20,000/40,000

/user/kovvuve/tracfone/tracfone_v3.csv

feature name	id_features (,VZW_IMSI,IMEI, mtn(mdn))	
examples		

cpe_daily_data_usage

/usr/apps/vmas/cpe_daily_data_usage/

id_features {CUST_ID,IMSI,IMEI, mdn_5g}	fiveg_usage_ percentage	fourg_total_mb	fiveg_total_mb
	99.95		
	0		

speedtest_vmb_v2

jdbc:postgresql://cospvmaspa7.nss.vzwnet.com:5432/fwa

id_features (IMEI, mdn_5g)	downloadresult	uploadresult	latency
	236	21	24.0

heartbeat

CRSP: 2,000,000

/user/kovvuve/owl_history_v3/

id_features (IMSI,IMEI, mdn)	ServiceDownPerc ServiceDowntime ServiceUptime	Numerical KPIs (SNR, 5GSNR, CQI, MemoryPercentFree, BRSRP %receivedCount)	NetworkSwitch CurrentNetwork	FailurePerc LTERACHAttemptCount, LTERACHFailureCount LTEHandOverAttemptCount LTEHandOverFailureCount NRSCGChangeCount NRSCGChangeFailureCount

OMA: 100,000

/user/heartbeat7min/parsed/

id_features (IMSI,IMEI, mdn)	Numerical KPIs (SNR, 5GSNR, CQI, MemoryPercentFree, BRSRP)	NetworkSwitch CurrentNetwork

reset: 300,000

/fwa_agg/fwa_reset_raw

id_features (sn)	reset_count

Figure 1 5G home score Profile.

Data Inventory

Main Table: cust_line

Description:

This table serves as the primary repository for all 5g_home_wifi customers, encompassing essential features such as cust_id, imsi, imei, and mdn. It also includes other pertinent attributes like price_plan and device_product_name.

Details:

device_product_name: Indicates the type of Verizon internet gateway router associated with the customer, such as ASK-NCQ1338FA, FSNO21VA and ARC-XCI55AX.

cpe_model_name	count
ARC-XCI55AX	870396
ASK-NCQ1338FA	521629
WNC-CR200A	257445
FSNO21VA	166187
ASK-NCQ1338	156894
NCQ1338E	51843

Price_plan_description: Specifies the customer's subscription plan, such as "5G Home" and "5G Home Plus," each with unique characteristics such as speed, video streaming quality, and warranty duration.

Price_plan_code: further details of price_plan_description

The relationship between **device_product_name, Price_plan_description** and **Price_plan_code** are shown below

cpe model name	Price Plan Description	Price Plan Code	Count
	LTE HOME	50010	138806
		67577	20997
	LTE HOME PLUS	67584	17565
ARC-XCI55AX	5G HOME	50127	274750
		67571	85626
	5G HOME PLUS	67576	200087
		50129	137201
	5G HOME	67571	45717
		50127	194123
ASK-NCQ1338FA	5G HOME PLUS	67576	92565
		50129	114435
	LTE HOME	50010	61507
	5G HOME	67571	67891
WNC-CR200A	5G HOME PLUS	67576	190968
	LTE HOME PLUS	67584	14808
	LTE HOME	67577	13424
	5G HOME	50127	47978
ASK-NCQ1338	5G HOME PLUS	50129	21151
	LTE HOME	50010	58316
		38365	29081

5g Home

	Price Plan Code	Count

	LTE BUSINESS INTERNET 10MBPS 25GB/300GB $79	48390	18455
	LTE BUSINESS INTERNET 25MBPS 50GB/300GB $109	48423	20288
	LTE BUSINESS INTERNET 50MBPS 150GB/300GB $209	48445	10804
FSNO21VA	5G BUSINESS INTERNET 100MBPS $69	51219	61565
	5G BUSINESS INTERNET 200MBPS $99	53617	44108
	LTE BUSINESS INTERNET PLUS 25MBPS $119	46799	1126
	LTE BUSINESS INTERNET 10MBPS 25GB/300GB $79	48390	7339
	LTE BUSINESS INTERNET 25MBPS 50GB/300GB $109	48423	9446
NCQ1338E	LTE BUSINESS INTERNET 50MBPS 150GB/300GB $209	48445	1705
	5G BUSINESS INTERNET 100MBPS $69	51219	19180
		27976	1188
	5G BUSINESS INTERNET 200MBPS $99	53617	6606

Tracfone:

In addition to Cust_Line, roughly 20,000 customers come from prepaid tracfone.

Data Usage Table:
cpe_daily_data_usage

Description:

This table captures daily data usage metrics, focusing on 5G data consumption. It contains numerical features such as fourg_total_mb, fiveg_total_mb, and fiveg_usage_percentage, reflecting the volume and proportion of data usage across different network generations.

Details:

fourg_total_mb: Volume of 4G data consumed by the customer.

fiveg_total_mb: Volume of 5G data consumed by the customer.

data_usage: total Volume of data consumed by the customer.

fiveg_usage_percentage: Percentage of total data usage attributed to 5G connectivity.

Speed test Table: speedtest_vmb_v2

Description:

This table records speed-related test results, intermittently conducted for select customers. It includes features such as

<u>downloadresult</u>, <u>uploadresult</u>, and <u>latency</u>, representing download/upload speeds and network latency, respectively.

Details:

downloadresult: Download speed measured during speed tests.

uploadresult: Upload speed measured during speed tests.

latency: Delay in network communication observed during tests.

Each price plan has related speed threshold
vbg_speeds = {

    '51219': {'Download': 100, 'Upload': 20, 'PPLAN_DESC': '5G BUSINESS INTERNET 100MBPS $69'},

    '27976': {'Download': 100, 'Upload': 20, 'PPLAN_DESC': '5G BUSINESS INTERNET 100MBPS $69'},

    '53617': {'Download': 200, 'Upload': 10, 'PPLAN_DESC': '5G BUSINESS INTERNET 100MBPS $99'},

    '48390': {'Download': 10, 'Upload': 6, 'PPLAN_DESC': 'LTE BUSINESS INTERNET 10MBPS 25GB/300GB $79'},

    '48423': {'Download': 25, 'Upload': 6, 'PPLAN_DESC': 'LTE BUSINESS INTERNET 25MBPS 50GB/300GB $109'},

    '48445': {'Download': 50, 'Upload': 6, 'PPLAN_DESC': 'LTE BUSINESS INTERNET 50MBPS 150GB/300GB $209'},

```python
    '46799': {'Download': 25, 'Upload': 6,
'PPLAN_DESC': 'LTE BUSINESS INTERNET PLUS
25MBPS $119'},
    '46798': {'Download': 10, 'Upload': 6,
'PPLAN_DESC': 'LTE BUSINESS INTERNET PLUS
10MBPS $89'},
    }

vcg_speeds = {
    '50010': {'Download': 50, 'Upload': 6, 'Latency':
100, 'PPLAN_DESC':"LTE HOME"},
    '50011': {'Download': 50, 'Upload': 6, 'Latency':
100, 'PPLAN_DESC':"LTE HOME"},
    '67577': {'Download': 25, 'Upload': 4, 'Latency':
100, 'PPLAN_DESC':"LTE HOME"},
    '38365': {'Download': 25, 'Upload': 4, 'Latency':
100, 'PPLAN_DESC':"LTE HOME"},  # Existing entries

    '67584': {'Download': 25, 'Upload': 4, 'Latency':
100, 'PPLAN_DESC':"LTE HOME PLUS"},
    '65655': {'Download': 25, 'Upload': 4, 'Latency':
100, 'PPLAN_DESC':"LTE HOME PLUS"},
    '65656': {'Download': 25, 'Upload': 4, 'Latency':
100, 'PPLAN_DESC':"LTE HOME PLUS"},

    '50044': {'Download': 85, 'Upload': 10, 'Latency':
30, 'PPLAN_DESC':"5G HOME"},
    '50055': {'Download': 85, 'Upload': 10, 'Latency':
30, 'PPLAN_DESC':"5G HOME"},
    '50127': {'Download': 85, 'Upload': 10, 'Latency':
30, 'PPLAN_DESC':"5G HOME"},
```

'50128': {'Download': 85, 'Upload': 10, 'Latency': 30, 'PPLAN_DESC':"5G HOME"},

'67571': {'Download': 50, 'Upload': 5, 'Latency': 30, 'PPLAN_DESC':"5G HOME"},

'67567': {'Download': 85, 'Upload': 10, 'Latency': 30, 'PPLAN_DESC':"5G HOME"},

'50129': {'Download': 85, 'Upload': 10, 'Latency': 30, 'PPLAN_DESC':"5G HOME PLUS"},

'67576': {'Download': 85, 'Upload': 10, 'Latency': 30, 'PPLAN_DESC':"5G HOME PLUS"},

'67568': {'Download': 300, 'Upload': 25, 'Latency': 30, 'PPLAN_DESC':"5G HOME PLUS"},

'50116': {'Download': 300, 'Upload': 50, 'Latency': 30, 'PPLAN_DESC':"5G HOME PLUS"},

'50117': {'Download': 300, 'Upload': 50, 'Latency': 30, 'PPLAN_DESC':"5G HOME PLUS"},

'50130': {'Download': 85, 'Upload': 10, 'Latency': 30, 'PPLAN_DESC':"5G HOME PLUS"},

'39425': {'Download': 300, 'Upload': 50, 'Latency': 30, 'PPLAN_DESC':"5G HOME INTERNET"},

'39428': {'Download': 300, 'Upload': 50, 'Latency': 30, 'PPLAN_DESC':"5G HOME INTERNET"},

}

Heartbeat Tables: CRSP and OMA

Description:

These tables monitor the connectivity and performance of 5G Home services, recording activities at frequent intervals (every 5 minutes for CRSP, and every 15 minutes for OMA). These tables contain the majority features used for 5g home Score.

CRSP:

Features include <u>ServiceDownPercentage</u>, <u>NetworkSwitch</u>, <u>SNR</u>, <u>5GSNR</u>, <u>CQI</u>, <u>MemoryPercentFree</u>, <u>BRSRP</u>, <u>4GRSRP</u>, and failure percentage metrics (<u>LTERACHFailurePerc</u>, <u>LTEHandOverFailurePerc</u>, and <u>NRSCGChangeFailurePerc)</u>.

OMA:

Similar features to CRSP, excluding MemoryPercentFree and failure percentage metrics (LTERACHFailurePerc, LTEHandOverFailurePerc, NRSCGChangeFailurePerc). Both tables provide crucial insights into network stability, performance metrics, and potential issues affecting customer experience.

Scoring Mechanism:

The scoring mechanism involves:

1. Determining the individual feature scores for each feature, primarily based on their statistical ranking.

2. Aggregating feature score to Category score.
3. Aggregating Category score to 5g Home score.

Feature To FeatureScore using distribution statistics

1. Monthly distribution:

The statistics (1%, 50%, 99%) comes from previous 1 month distribution, and used to transform current day features into score. The reason is explain below using Example of BRSRP across various device models over several days:

While the daily statistics of BRSRP such as median, 1% percentile, and 99% percentile do not vary drastically day-to-day, there might be exceptions where significant variations occur.
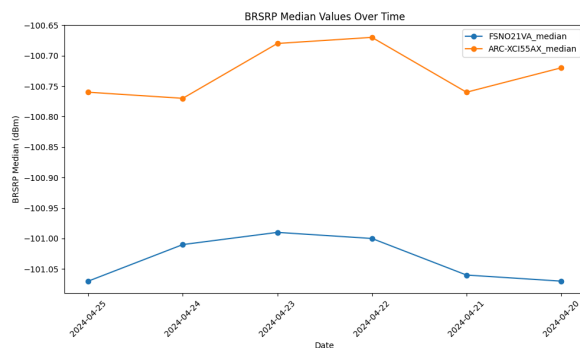
1. To mitigate **the risk of these outliers** influencing the feature scoring unduly, **adopting a one-month** distribution period for calculating these statistics has been considered.
2. Utilizing a month-long aggregation period for statistics will help in creating a more **robust** model, less susceptible to the occasional

variances that can occur in daily measurements.

3. The **continuous monitoring** of these metrics will be essential to maintain the accuracy and relevance of the scoring mechanism.

2. Normalization and Standardization:

In this section, we outline the scoring mechanism devised to transform a near-normal distribution feature into a standardized score range from 0 to 100. This mechanism aims to provide a meaningful representation of the distribution's characteristics while ensuring that extreme outliers are appropriately handled.

1.

Near Normal Distribution with Different Scales Above and Below Median — Median = 3.16, 99% = 25.99, 1% = -17.73	Original Normal distribution

Shift median to (50 Points):

The median of the distribution is assigned a score of 50 points. This serves as a central reference point, indicating the typical or average value of the feature.

Scale [median, top 99%] -> [50,100]
Scale [low1%, median] -> [0,50]

Percentiles 1% to 50%:
The range between the 1st and 50th percentiles is uniformly mapped to a score range of 0 to 50 points.
This evenly spreads values in the lower half of the distribution across the lower half of the score range.

Percentiles 50% to 99%:
The range between the 50th and 99th percentiles is uniformly mapped to a score range of 50 to 100 points.
This evenly spreads values in the upper half of the distribution across the upper half of the score range.

Adjusted Near Normal Distribution with Different Scales Above and Below Median

Legend:
- Median = 50.00
- 99% = 100.00
- 1% = 0.00

Cap:
If lower than 1%, assign as 0
If higher than 99%, assign as 100

99th Percentile Score (100 Points): The value at the 99th percentile of the distribution is assigned a score of 100 points. This ensures that extreme outliers are capped at the maximum score, representing exceptionally high values.

1st Percentile Score (0 Points): The value at the 1st percentile of the distribution is assigned a score of 0 points. This ensures that extreme outliers are capped at the minimum score, representing exceptionally low values.

3. Advantage of standardizing-normalizing over Direct Percentile Scoring:

1. In a normal distribution, most data points cluster around the mean.
2. By standardizing-normalizing, the scores of values near the mean (which represent most of the data) change little relative to each other.
3. This method reduces sensitivity to small changes near the median. Small differences in feature values do not lead to disproportionate score changes.

4. Interpretation of Scores:

A score of 10 indicates that the value of the feature falls within the lower half of the distribution but **closer to the extreme lower tail,** suggesting a relatively low value.
A score of 50 indicates that the value of the feature is at the median of the distribution, representing an average value.
A score of 75 indicates that the value of the feature falls within the upper half of the distribution but **not in the extreme upper tail**, suggesting a relatively high value.
A score of 100 indicates that the value of the feature falls within the highest 1% of the distribution, suggesting an exceptionally high value or extreme outlier.

5. Features follows this method to transform
feature to score

networkSignalScore = { "4GRSRP", "BRSRP", "CQI", "SNR", "5GSNR" }

dataScore= {
~~"5g_uptime","fiveg_usage_percentage",~~
"data_usage" }

Feature To FeatureScore using price plan threshold

Instead of using statistics (1%, 50%, 99%) from the
feature distribution, this method uses the threshold
defined in the price plan advertisement, as shown below.

Distribution of downloadresult of 48423-2024-04-18

Distribution of downloadresult of 50127-2024-04-18
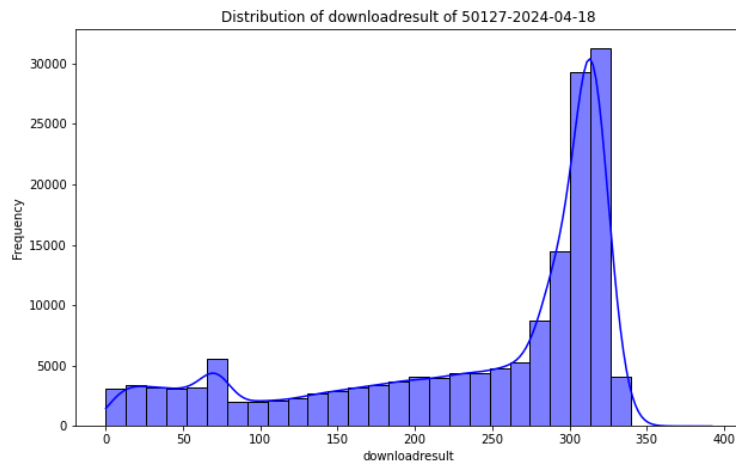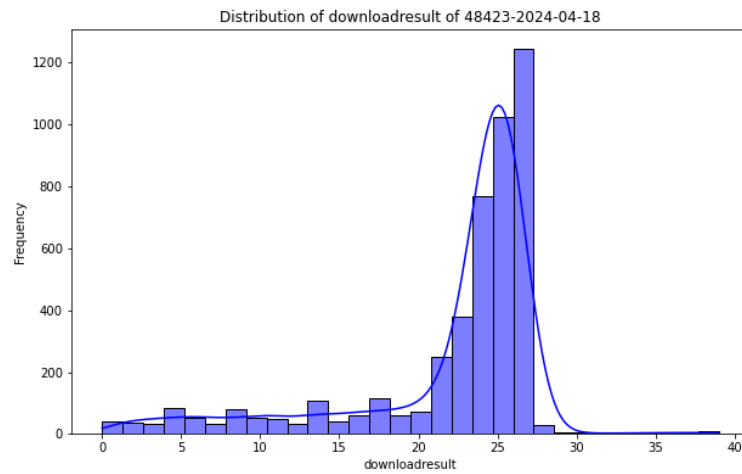
speed_threshold_dict = {

'51219': [0,100,150],
'27976': [0,100,150],
'53617': [0,200,300],

'48390': [0,10,15],
'48423': [0,25,40],
'48445': [0,50,75],
'46799': [0,25,40],
'46798': [0,10,15],

'50010': [0,50,70],
'50011': [0,50,70],
'67577': [0,25,40],
'38365': [0,25,40],

'67584': [0,25,40],

```
        '65655': [0,25,40],
        '65656': [0,25,40],

        '50044': [0,300,400],
        '50055': [0,300,400],
        '50127': [0,300,400],
        '50128': [0,300,400],
        '67571': [0,100,150],
        '67567': [0,300,400],

        '50129': [0,300,400],
        '67576': [0,300,400],
        '67568': [0,1000,1500],
        '50116': [0,1000,1500],
        '50117': [0,1000,1500],
        '50130': [0,300,400],

        '39425': [0,1000,1500],
        '39428': [0,1000,1500],
}
```

1. Interpretation:

Score 50 means it reaches the advertised speed tire.

Distribution of downloadresult of 67571-downloadresult
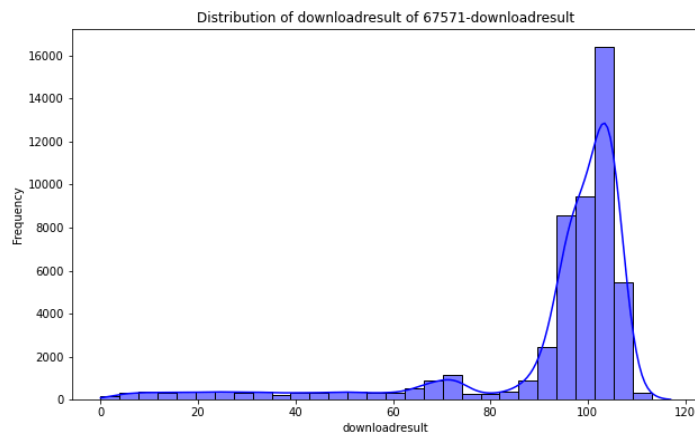
New/Existing Plan ID (examples)	67571 - for new customers only
Spectrum to be utilized on Price Plan	n77 + LTE
APN	V5GA01INTERNET
Max Up To Speed - DL	100Mbps
Max Up To Speed (Peak) - UL	10Mbps =>11Mbps
Customer disclosure - DL	50 - 85Mbps DL w/ speeds up to 100Mbps
Customer disclosure - UL	5-10Mbps
Customer disclosure - Latency (RTT)	30ms
Data Cap/ Threshold - DL / UL	unlimited

2. Features follows this method to transform feature to score

Distribution of latency of 67571-2024-04-18-uploadresult

Distribution of latency of 67571-latency
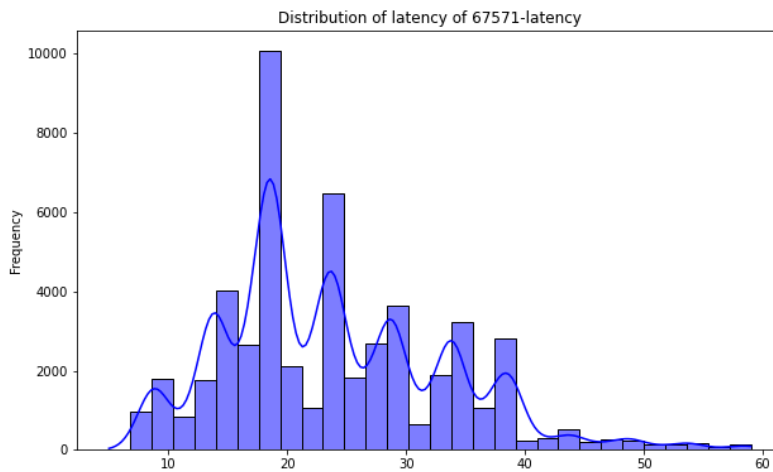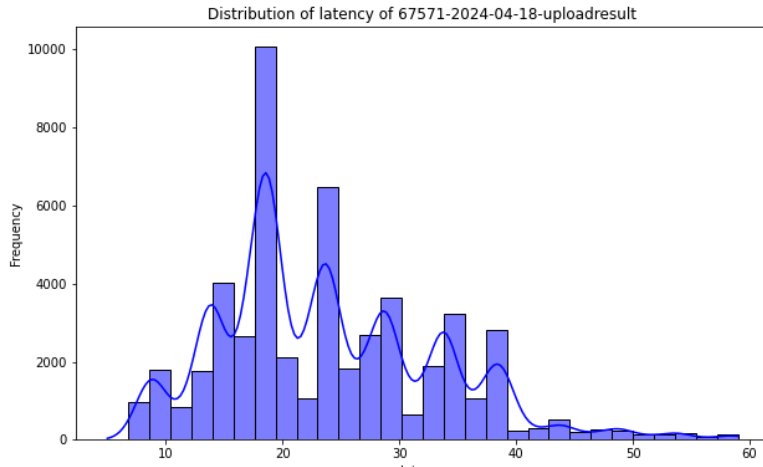
	mmWave - basic	mmWave - plus	mmWave - 5GHome (basic)	mmWave - 5GHome +
FWA			**Price Plan 1**	**Price Plan 2**
Launch Date	**2022**	**2022**	**2023 (new)**	**2023 (new)**
New/Existing Plan ID (examples)	**50044 Consumer** **50055 Employee**	*50116 Consumer* *50117 Employee*	**50044 Consumer** **50055 Employee**	*50116 Consumer* *50117 Employee*
Spectrum to be utilized on Price Plan	mmWave + LTE	mmWave + LTE	mmWave + LTE fallback	mmWave + LTE fallback
APN		V5GA01INTERNET	V5GA01INTERNET	V5GA01INTERNET

Max Up To Speed - DL	no cap	no cap	400Mbps	1.5Gbps
Max Up To Speed (Peak) - UL	no cap	no cap	20Mbps	75Mbps
Customer disclosure - DL	85-300Mbps	300-1000Mbps	85-300Mbps	300-1000Mbps
Customer disclosure - UL	typical 10Mbps	typical 50Mbps	10-20Mbps	25-75Mbps
Customer disclosure - Latency (RTT)	30ms	30ms	30ms	30ms

Distribution of uploadresult of 50044-uploadresult
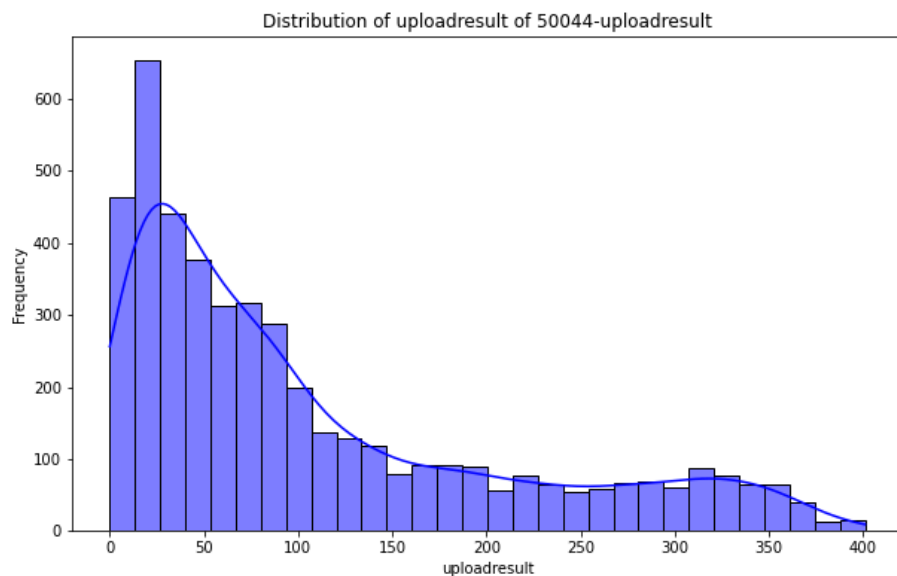
Feature To FeatureScore with Special

Case:

1. feature--(function)-->feature_score
2. Function should be reasonable
3. The feature_score should be consistent interpretable: below 50 is bad

Distribution of scaled_fiveg_usage_percentage

Distribution of scaled_5g_uptime
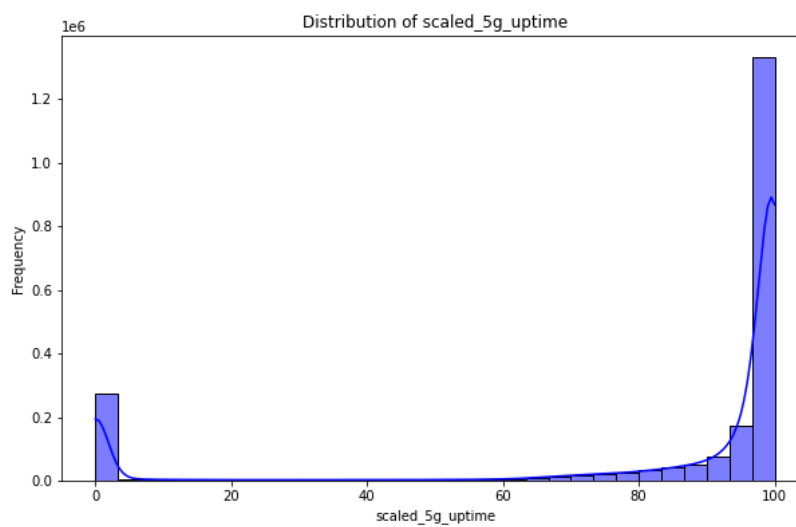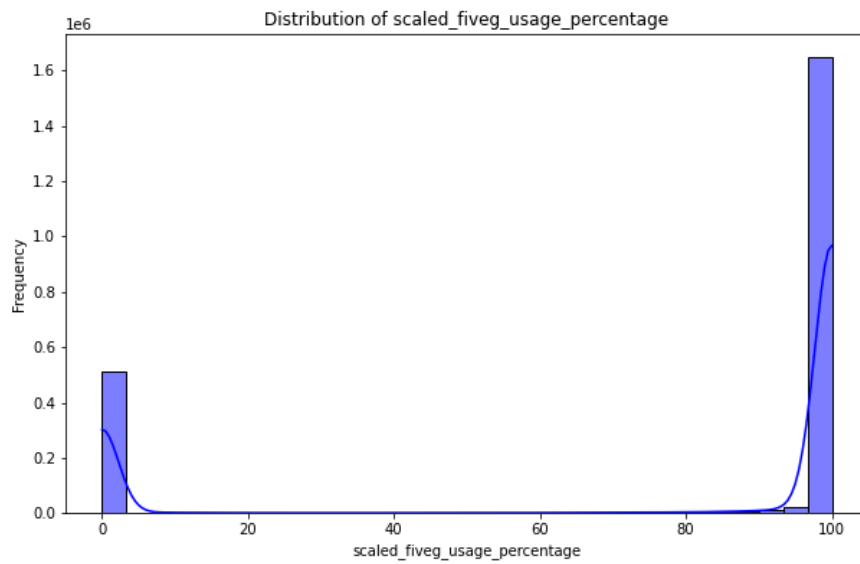
feature–(function)-->feature_score, feature_to_score function should lead to consistent interpretation of score.

Case 1: Fiveg_usage_percentage, 5g_uptime

Distribution of scaled_fiveg_usage_percentage

Distribution of scaled_5g_uptime
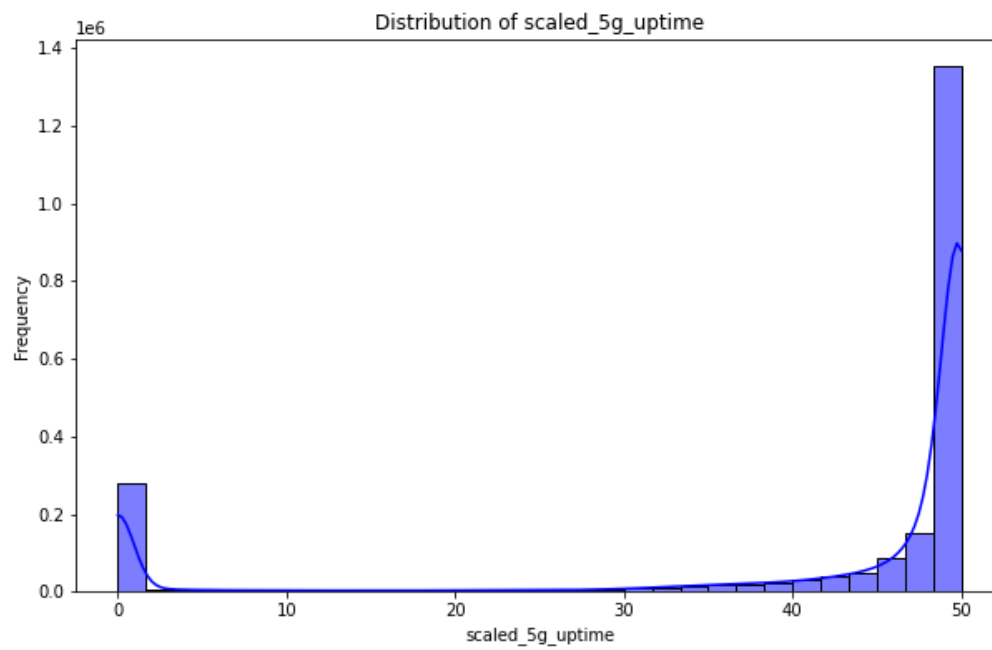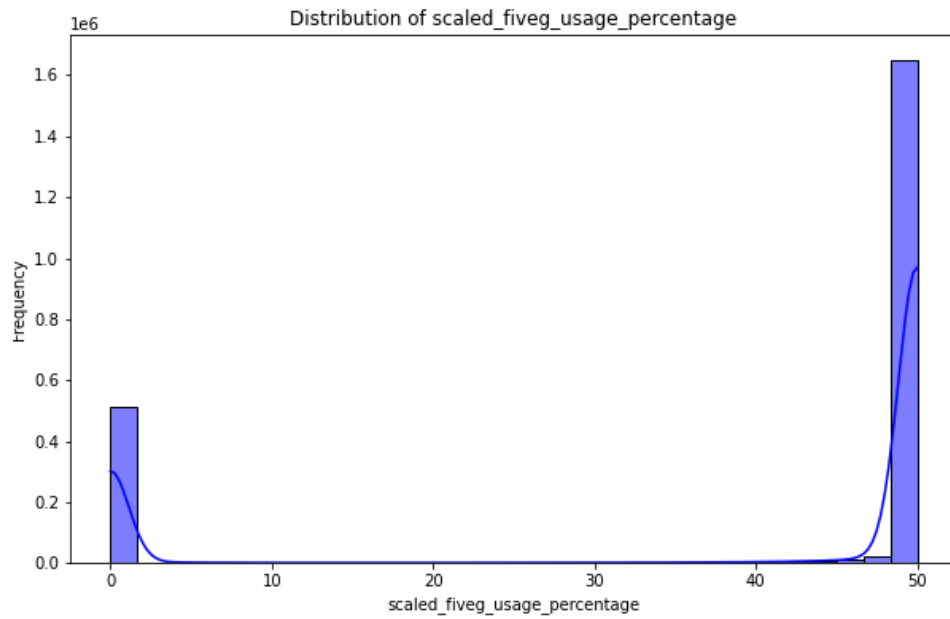
benefit:

```
dataScore_weights = {
        "scaled_5g_uptime": 0.25,
        "scaled_fiveg_usage_percentage": 0.25,
        "scaled_sqrt_data_usage": 0.5,
        }
```

If use 100, instead of 50

Distribution of scaled_5g_uptime

Distribution of scaled_fiveg_usage_percentage

Distribution of scaled_sqrt_data_usage

Distribution of dataScore
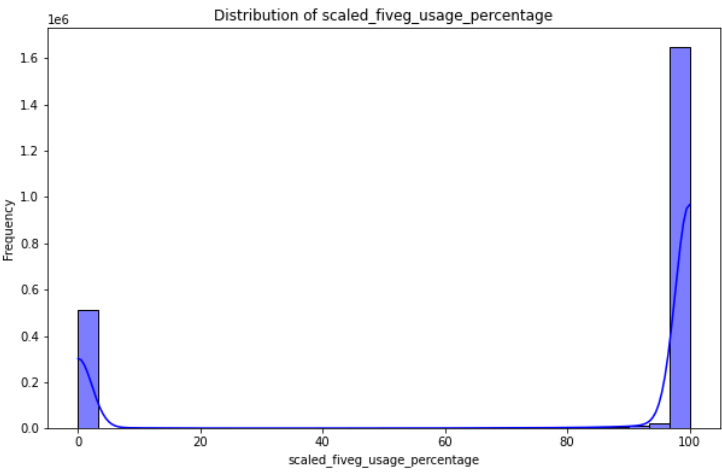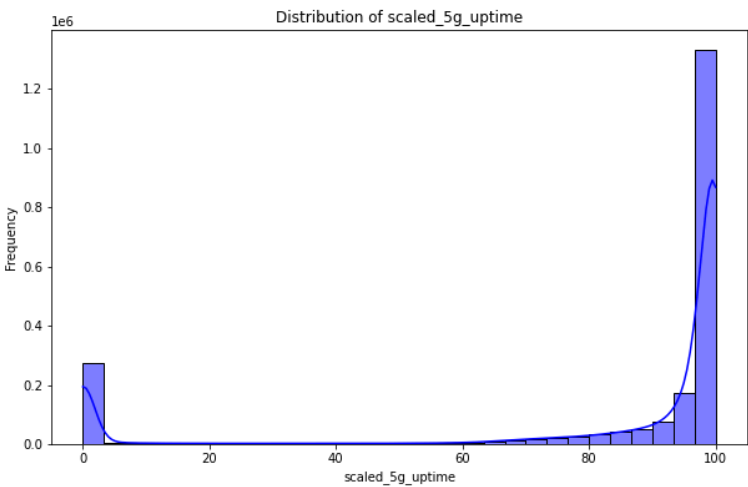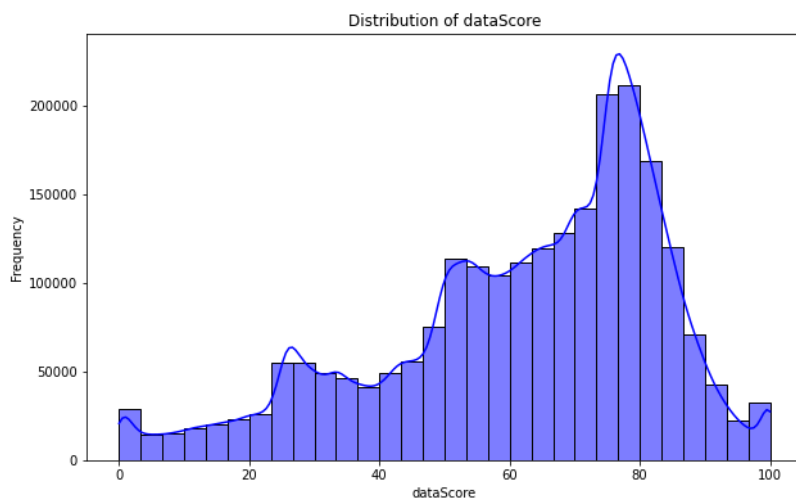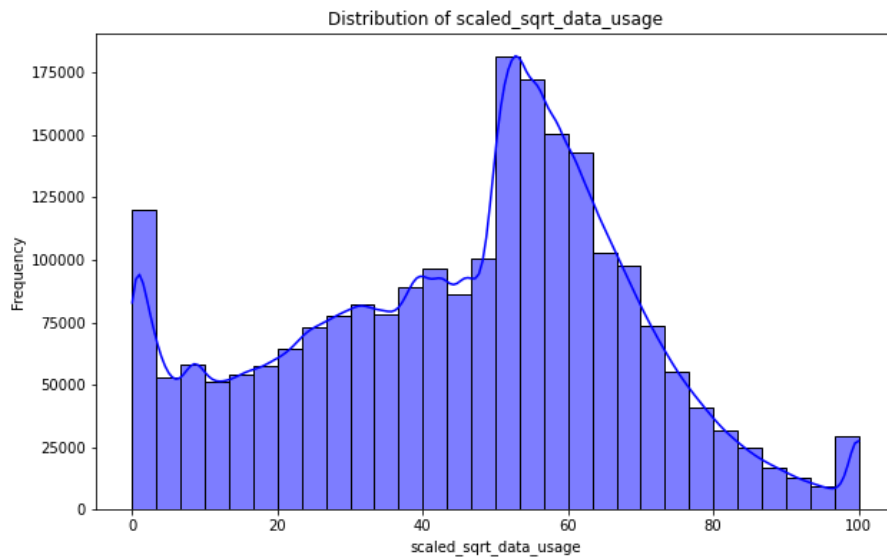
if you perform badly on data usage, not represented in category score, you may end up with 70.

If use 50

Distribution of scaled_5g_uptime

Distribution of scaled_fiveg_usage_percentage

Distribution of scaled_sqrt_data_usage

Distribution of dataScore
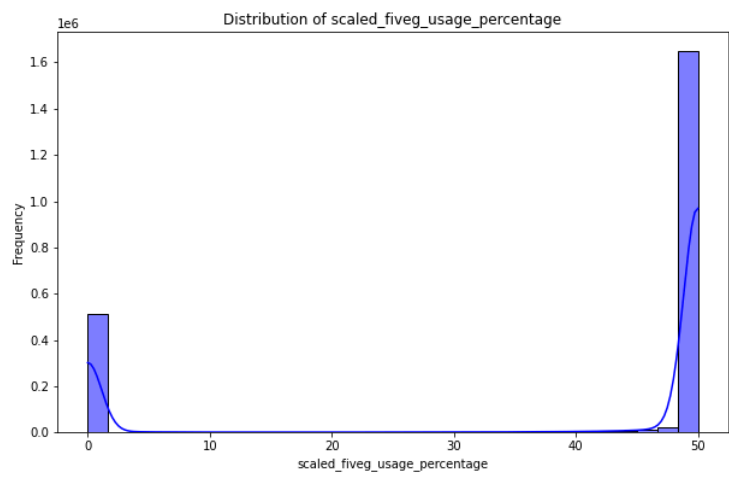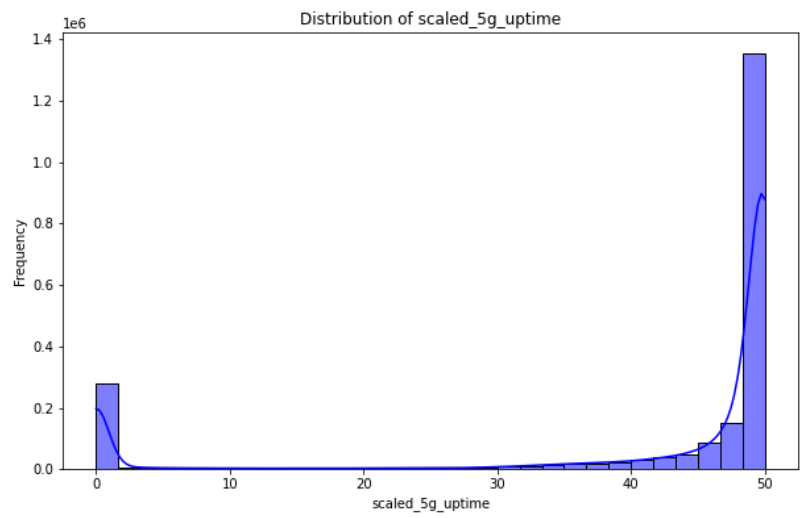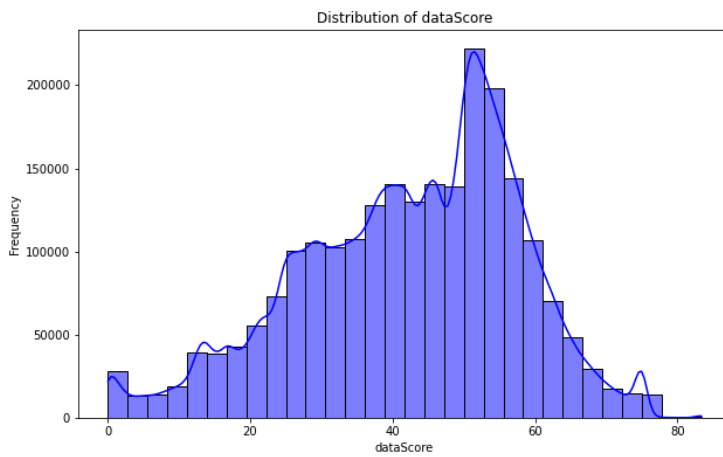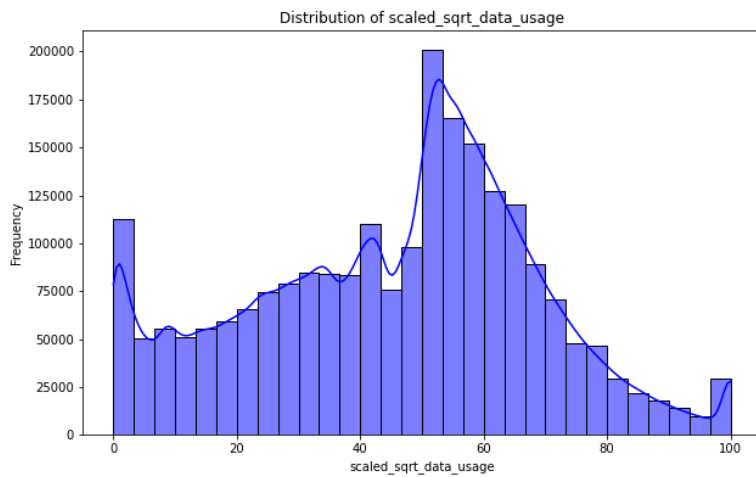
*map [50,80] to [50,100]

1. Focus on low score, if you perform badly, no matter which score, always represented in category score
2. Not overshadow other feature effect
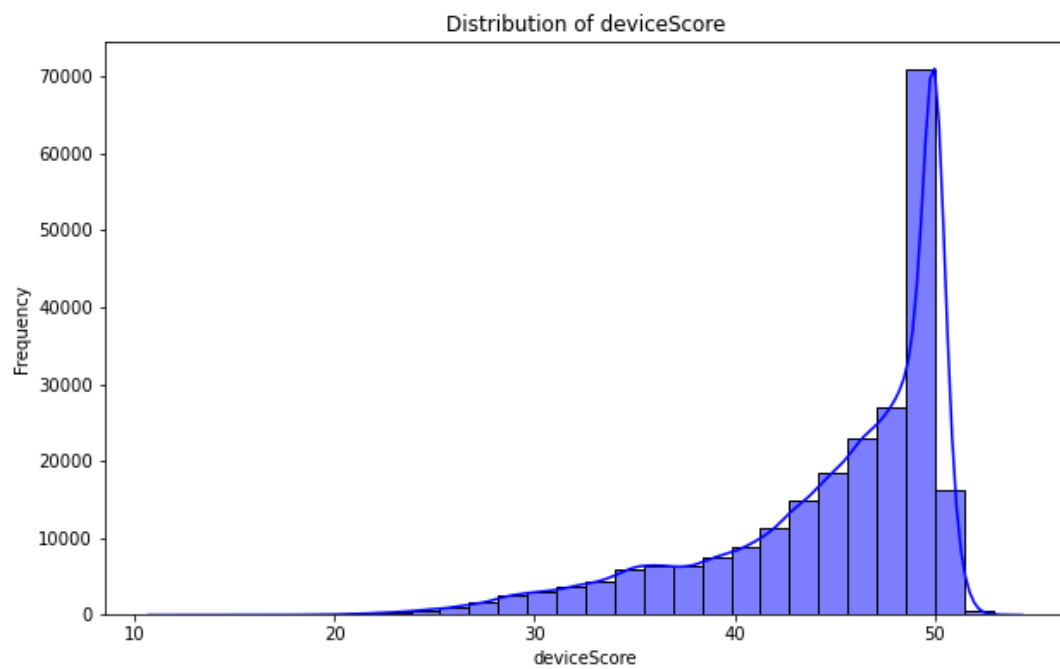

Case 2: switch_count_sum, percentageReceived

```
deviceScore_weights = {
            "scaled_switch_count_sum": 0.3,
            "scaled_percentageReceived":0.3,
            "scaled_reset_count":0.3,
            "avg_MemoryPercentFree":0.1
            }
```
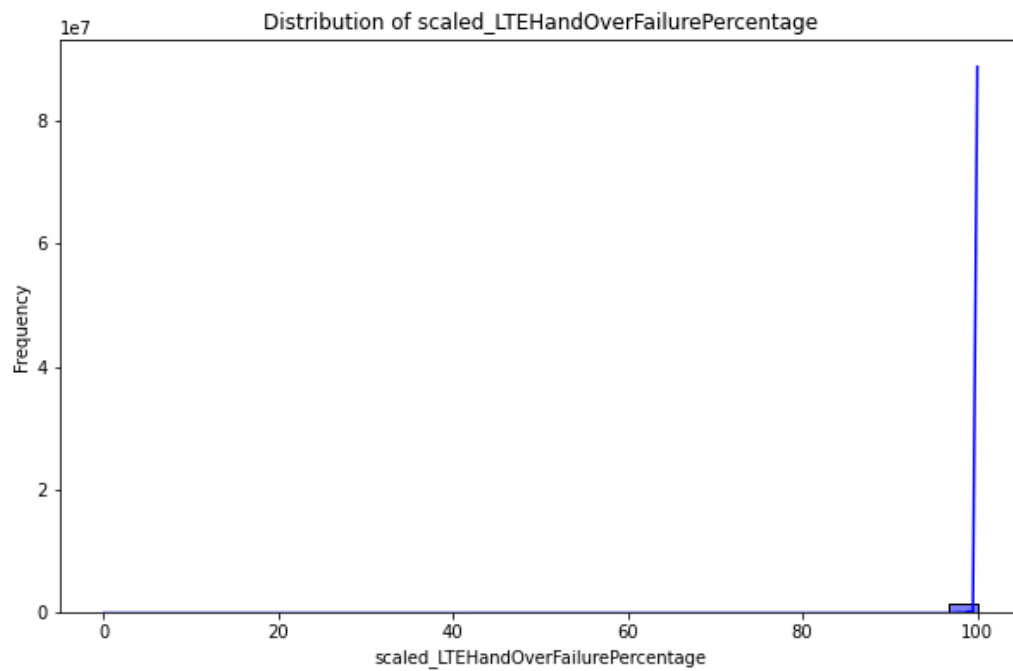
Distribution of scaled_switch_count_sum

Distribution of percentageReceived

Distribution of scaled_ServicetimePercentage

Distribution of scaled_avg_MemoryPercentFree

Distribution of deviceScore

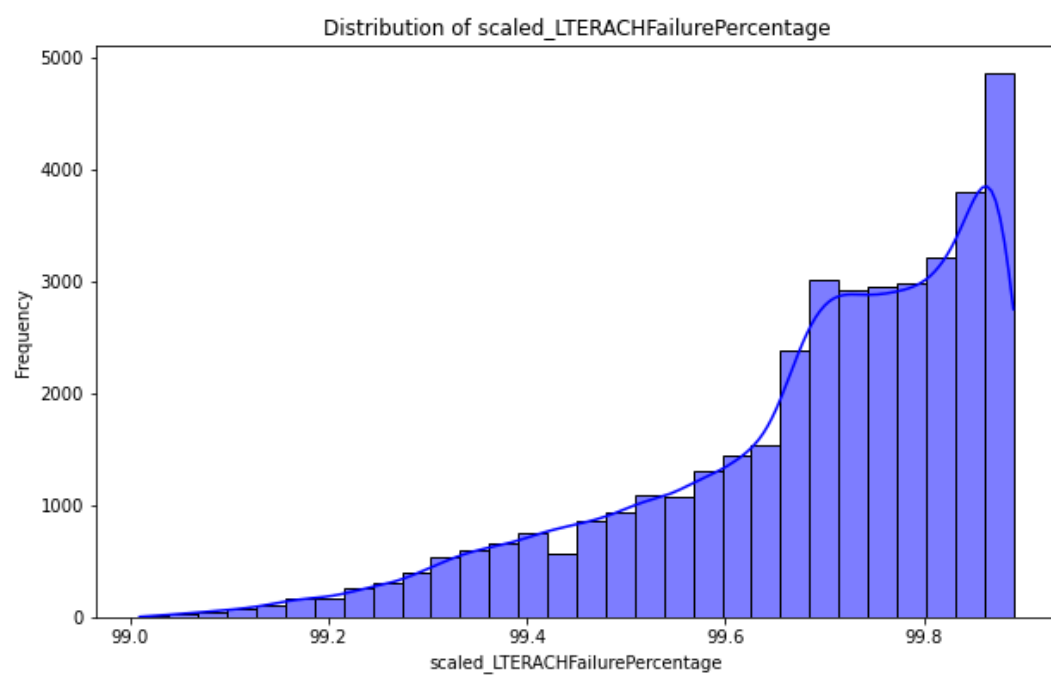After switch [0,100] to [0,50]

Distribution of deviceScore
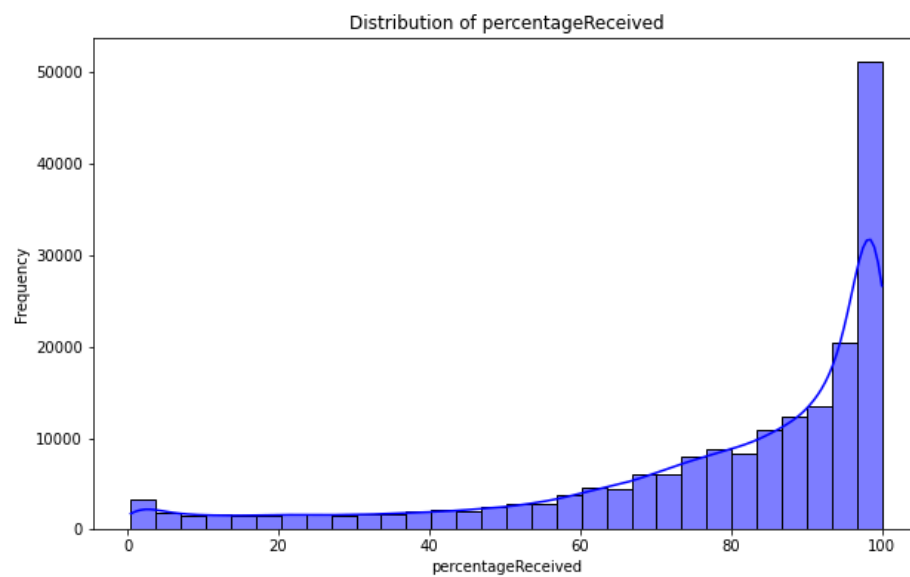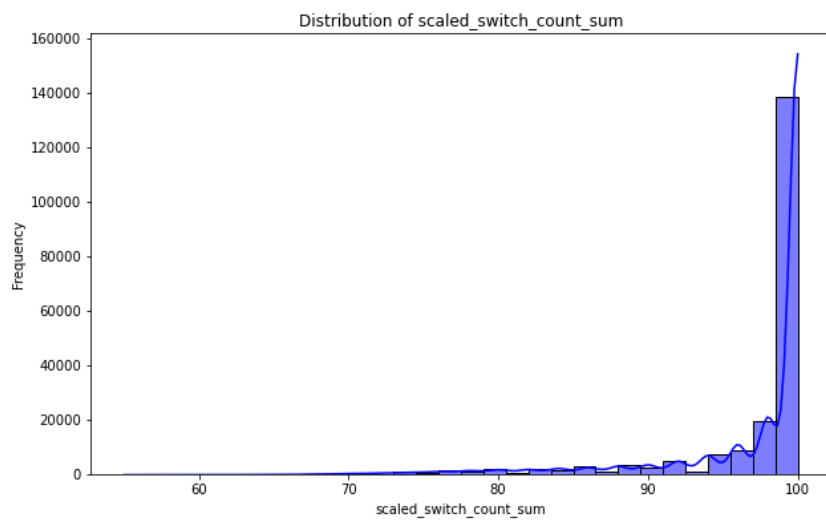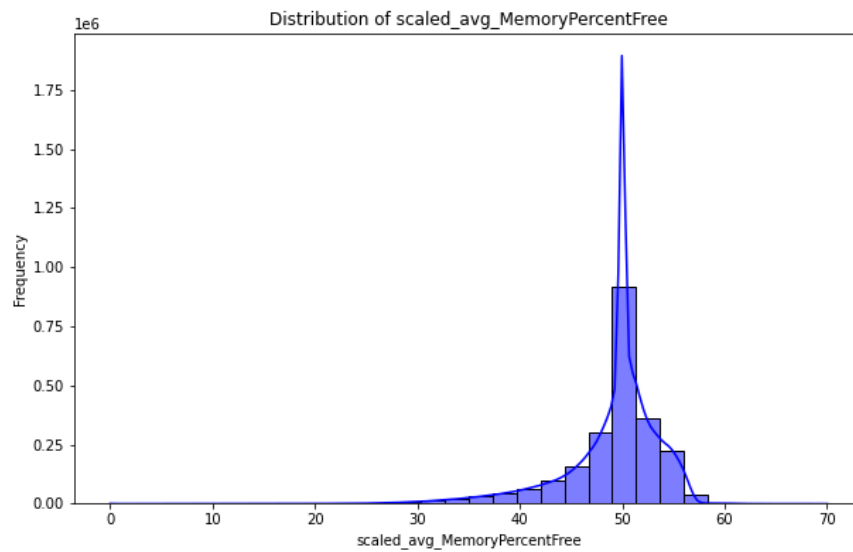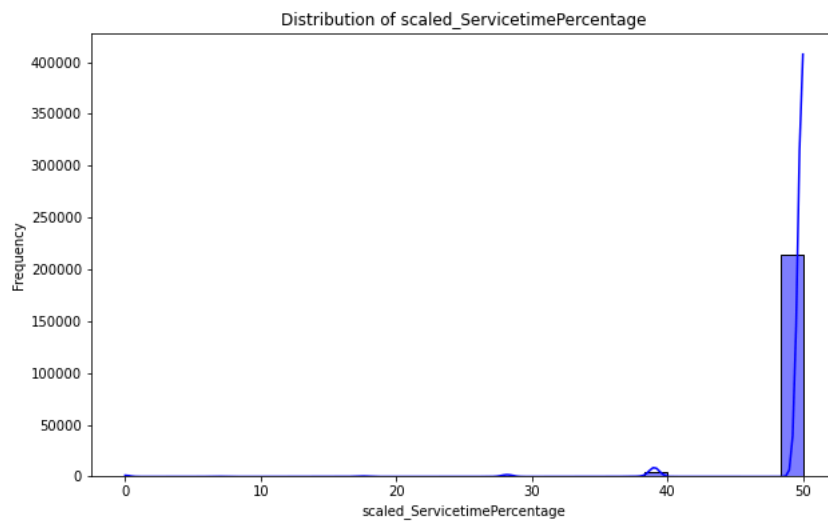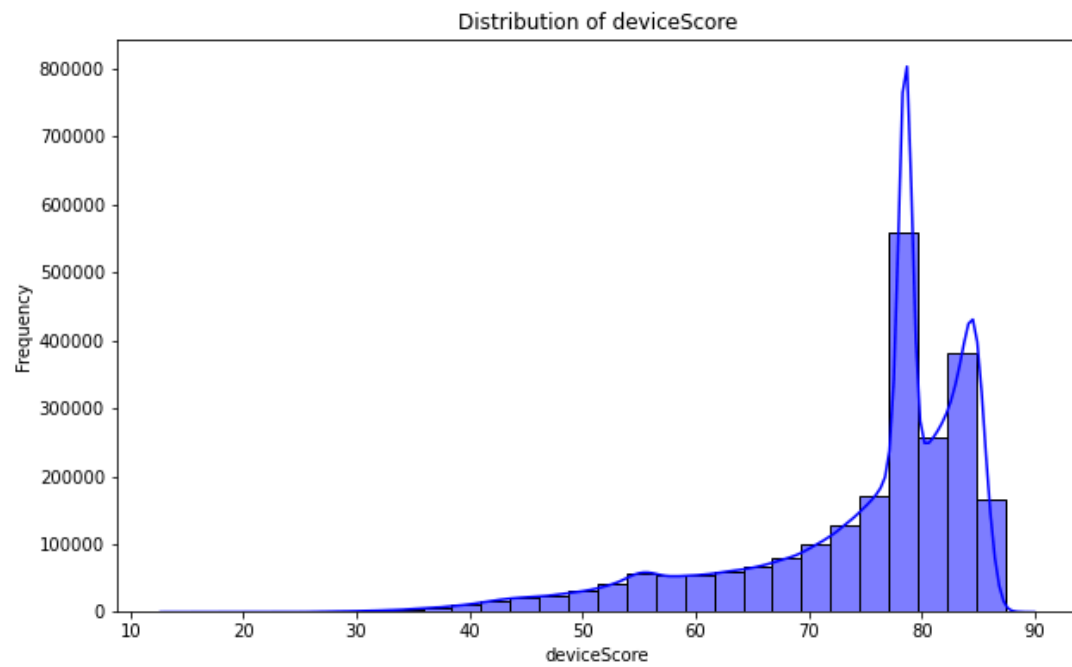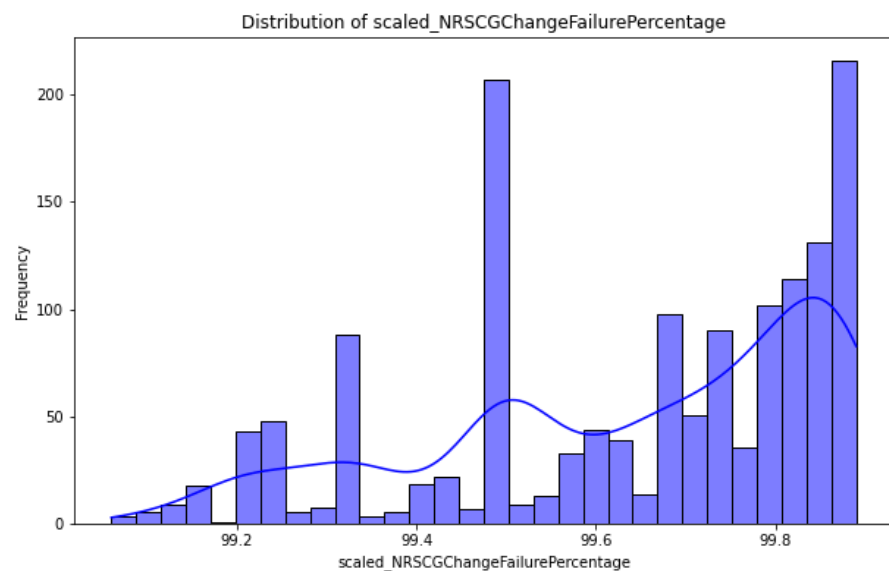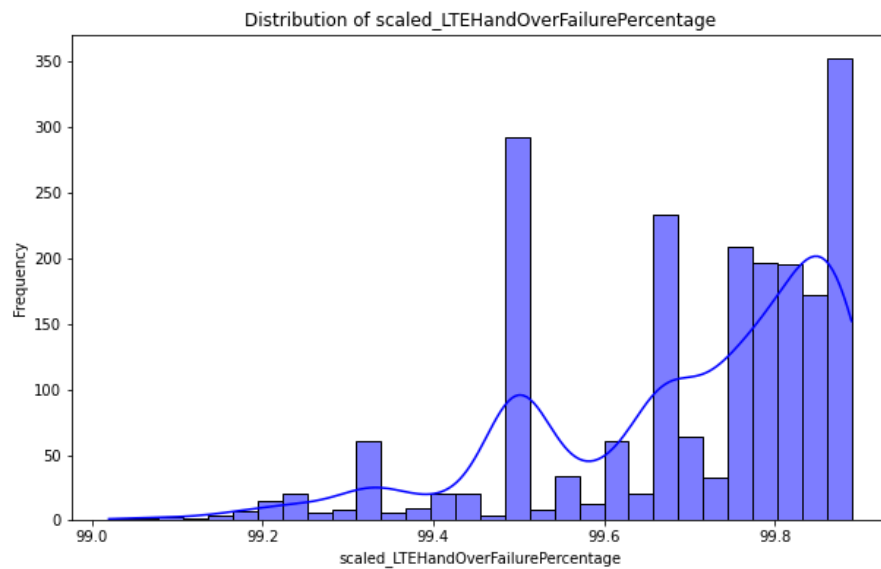
Case 3: LTERACHFailurePercentage, LTEHandOverFailurePercentage, NRSCGChangeFailurePercentage, reset_count, ServicetimePercentage

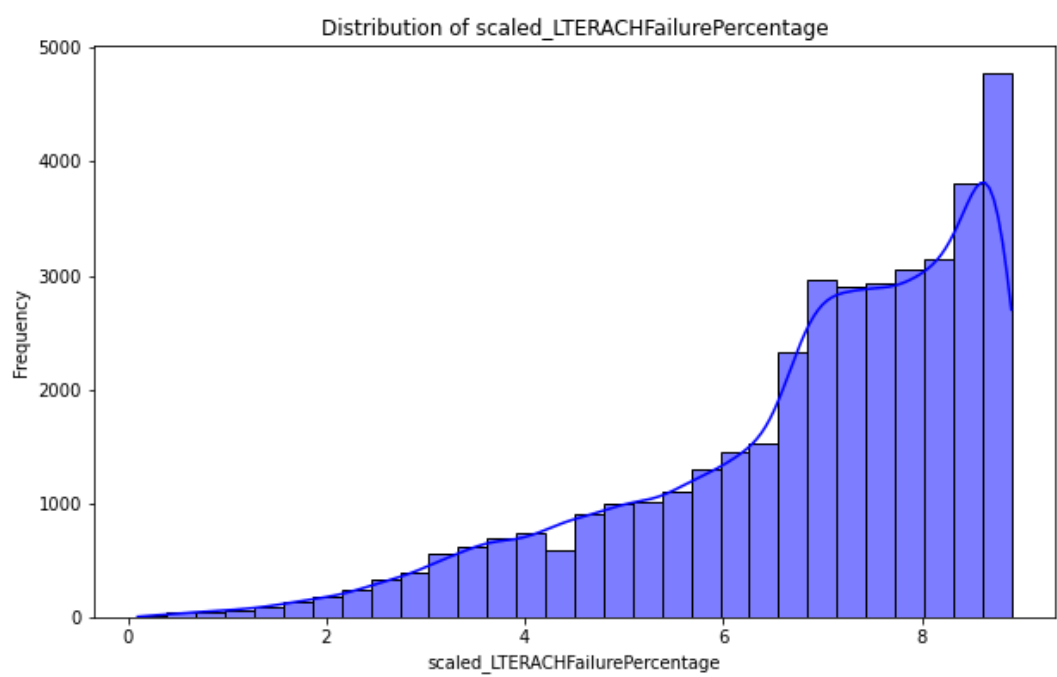Distribution of scaled_LTEHandOverFailurePercentage
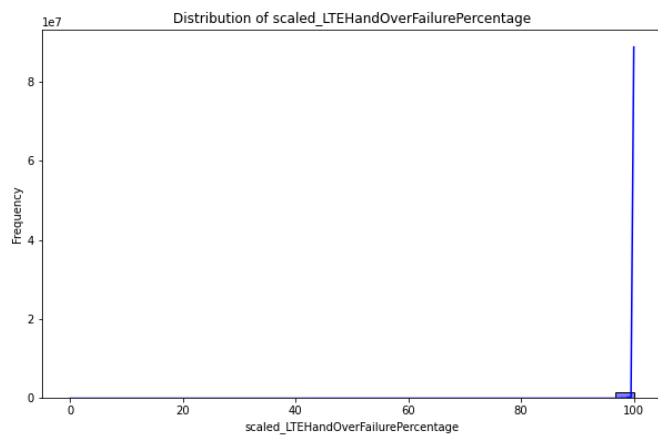
>99.9: 1782002
<99.9:　392541

Distribution of scaled_LTERACHFailurePercentage

Distribution of scaled_LTEHandOverFailurePercentage

Distribution of scaled_NRSCGChangeFailurePercentage

Distribution of scaled_LTERACHFailurePercentage

Distribution of networkFailureScore

Distribution of scaled_LTEHandOverFailurePercentage

reset_count

Distribution of reset_count

Distribution of scaled_reset_count
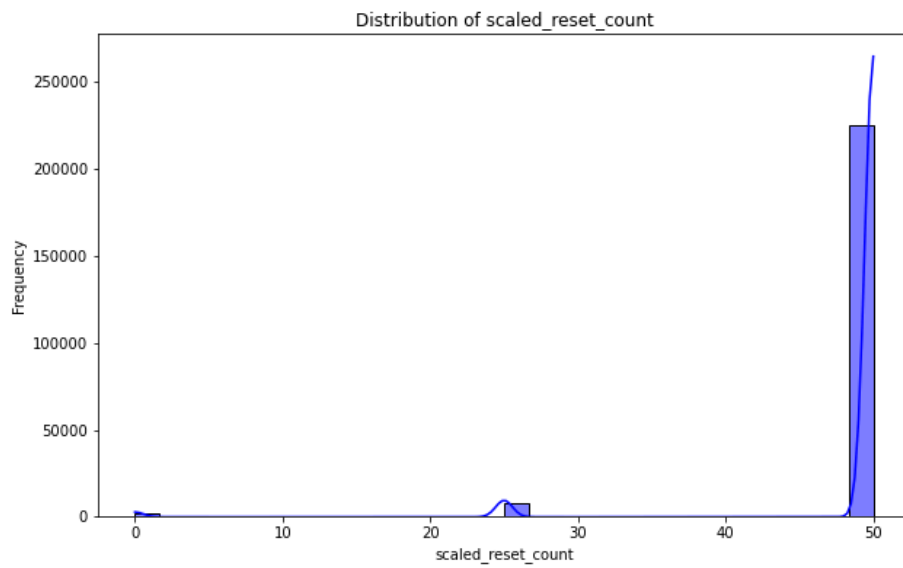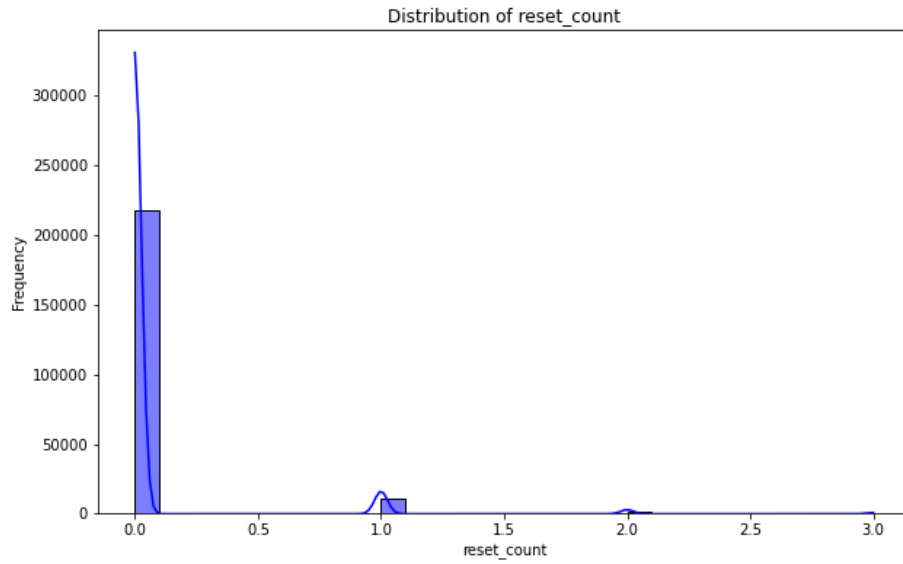
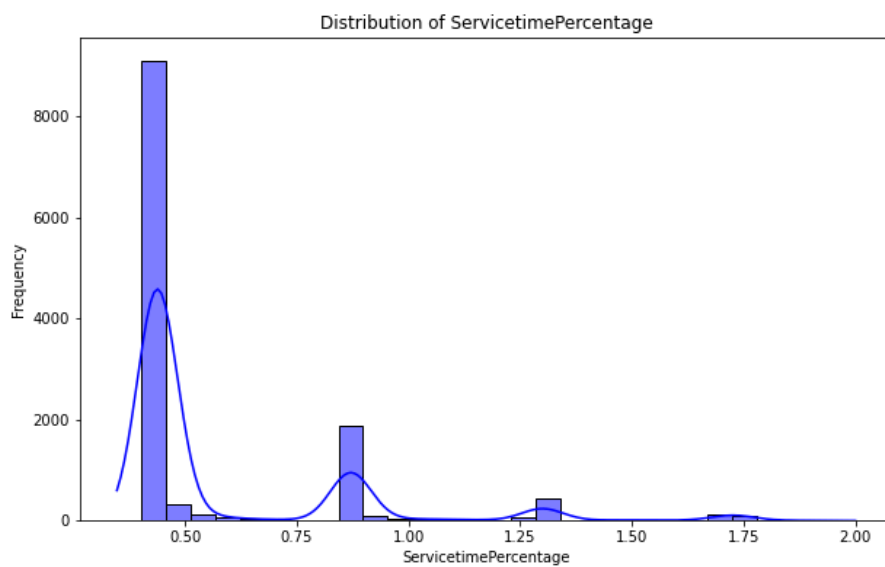|	
print(df_failure.filter(col("reset_count")==3).count())	5576
print(df_failure.filter(col("reset_count")==2).count())	19134

| print(df_failure.filter(col("reset_count")==1).count()) | 109142 |
| print(df_failure.filter(col("reset_count")==0).count()) | 2170636 |

ServicetimePercentage
[0,2]->[50,0]

Distribution of ServicetimePercentage

Shift

avg_MemoryPercentFree

Distribution of avg_MemoryPercentFree

Distribution of scaled_avg_MemoryPercentFree

[0,100]

Distribution of score
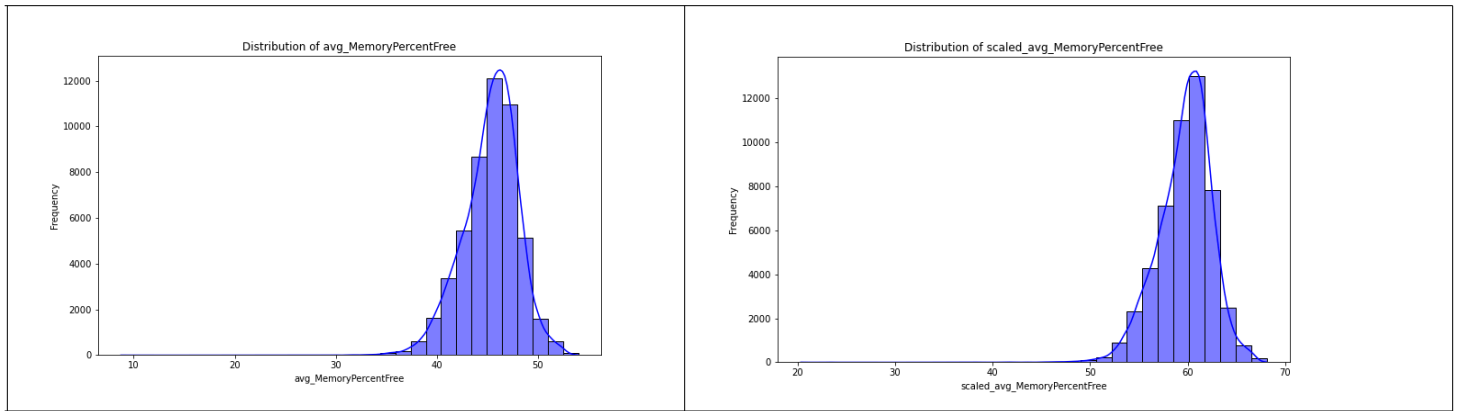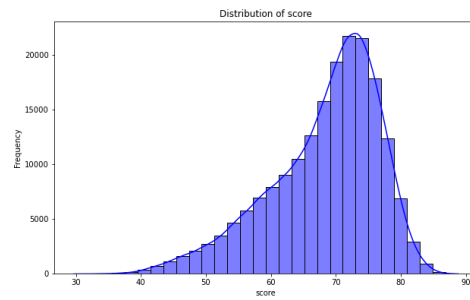
[0,50]: below 50ish is bad(below average), and is
consistent over all feature_score, categorical score,
overall_score

Drawback, Above 50, different interpretation

Distribution of score

Distribution of score

history records

user
ts 1
ts 2
ts 3
ts ...

4g-5GEARFCN_DL ———— 4g RSRP: value
5g-5GEARFCN_DL ———— 5g RSRP: null
4g-5GEARFCN_DL ———— 4g RSRP: null
5g-5GEARFCN_DL ———— 5g RSRP: value

aggregate

feature→score

user
4g_avg_RSRP ———— Scaled_4g_avg_RSRP
5g_avg_RSRP ———— Scaled_5g_avg_RSRP
five_g_percentage ———— *count of 5g-5GEARFCN_DL/ count of total*
four_g_percentage ———— *count of 4g-5GEARFCN_DL/ count of total*

scaled_RSRP =
(col("scaled_log_avg_BRSRP") * col("five_g_percentage") +
col("scaled_log_avg_4GRSRP") * col("four_g_percentage")) / 100

Feature aggregation

1. Feature Score to Category Score

$$S_i = \frac{\sum_{j=1}^{n_i} \begin{cases} w_{ij} \cdot f_{ij} & \text{if } f_{ij} \text{ is not null} \\ 0 & \text{if } f_{ij} \text{ is null} \end{cases}}{\sum_{j=1}^{n_i} \begin{cases} w_{ij} & \text{if } f_{ij} \text{ is not null} \\ 0 & \text{if } f_{ij} \text{ is null} \end{cases}}$$

2. Category Score to 5g Home Score

$$T = \frac{\sum_{i=1}^{3} \begin{cases} w_i \cdot S_i & \text{if } S_i \text{ is not null} \\ 0 & \text{if } S_i \text{ is null} \end{cases}}{\sum_{i=1}^{3} \begin{cases} w_i & \text{if } S_i \text{ is not null} \\ 0 & \text{if } S_i \text{ is null} \end{cases}}$$

networkSpeedScore_weights = {
         "scaled_uploadresult": 0.2,
         "scaled_downloadresult": 0.2,
         "scaled_latency": 0.2
     }
networkSignalScore_weights = {
         "scaled_log_avg_4GRSRP": 0.2,
         "scaled_log_avg_BRSRP": 0.2,
         "scaled_avg_CQI": 0.2,
         "scaled_log_avg_SNR": 0.2,
         "scaled_log_avg_5GSNR": 0.2,
     }
networkFailureScore_weights = {

"scaled_LTERACHFailurePercentage": 0.5,

"scaled_LTEHandOverFailurePercentage": 0.25,

"scaled_NRSCGChangeFailurePercentage": 0.25,
     }

```
dataScore_weights = {
            "scaled_5g_uptime": 0.2,
            "scaled_fiveg_usage_percentage": 0.5,
            "scaled_sqrt_data_usage": 0.3,

            }
deviceScore_weights = {
            "scaled_switch_count_sum": 0.25,
            "scaled_percentageReceived":0.25,
            "scaled_reset_count":0.25,
            "avg_MemoryPercentFree":0.25
            }
```

Appendix:

cpe_model_name	2024-04-25 BRSRP_median	2024-04-25 BRSRP_lower_5_percentile	2024-04-25 BRSRP_top_95_percentile
FSNO21VA	-101.07	-118.39	-68.89
ARC-XCI55AX	-100.76	-119.21	-70.55
ASK-NCQ1338FA	-100.2	-118.13	-71.02
WNC-CR200A	-99	-117.7	-69.66
tracfone	-102.74	-121.08	-71.38
NCQ1338E	-101.14	-119	-69.49
ASK-NCQ1338	-100.37	-119.82	-70.23
Others	-82.52339	-113.01	-49.563793
	2024-04-24 BRSRP_median	2024-04-24 BRSRP_lower_5_percentile	2024-04-24 BRSRP_top_95_percentile
FSNO21VA	-101.01	-118.4	-68.9
ARC-XCI55AX	-100.77	-119.19	-70.57

ASK-NCQ1338FA	-100.19	-118.08	-71
WNC-CR200A	-98.98	-117.68	-69.61
tracfone	-102.63	-121.21	-71.26
NCQ1338E	-101.11	-119	-69.26
ASK-NCQ1338	-100.38	-119.83	-70.17
Others	-82.57234	-113.12718	-49.492977
	2024-04-23 BRSRP_median	2024-04-23 BRSRP_lower_5_percentile	2024-04-23 BRSRP_top_95_percentile
FSNO21VA	-100.99	-118.4	-69
ARC-XCI55AX	-100.68	-119.12	-70.51
ASK-NCQ1338FA	-100.12	-118.03	-71
WNC-CR200A	-98.85	-117.58	-69.52
tracfone	-102.52	-121.13	-71.33
NCQ1338E	-101.086586	-119	-69.12
ASK-NCQ1338	-100.26	-119.76	-70.25
Others	-82.477	-112.95	-49.59368
	2024-04-22 BRSRP_median	2024-04-22 BRSRP_lower_5_percentile	2024-04-22 BRSRP_top_95_percentile
FSNO21VA	-101	-118.3	-68.87
ARC-XCI55AX	-100.67	-119.06	-70.5
ASK-NCQ1338FA	-100.14	-118.02	-70.95
WNC-CR200A	-98.87	-117.58	-69.44
tracfone	-102.5	-121.24	-71.17
NCQ1338E	-101.06	-119	-69.32
ASK-NCQ1338	-100.25	-119.64	-70.14

	2024-04-21 BRSRP_median	2024-04-21 BRSRP_lower_5_percentile	2024-04-21 BRSRP_top_95_percentile
Others	-82.636696	-113.03008	-49.623066
FSNO21VA	-101.06	-118.38	-68.9
ARC-XCI55AX	-100.76	-119.12	-70.43
ASK-NCQ1338FA	-100.21	-118.05	-70.94
WNC-CR200A	-98.93	-117.71	-69.46
tracfone	-102.6	-121.44	-71.58
NCQ1338E	-101	-119	-69.31
ASK-NCQ1338	-100.21	-119.63	-70
Others	-82.48329	-113	-49.7276

	2024-04-20 BRSRP_median	2024-04-20 BRSRP_lower_5_percentile	2024-04-20 BRSRP_top_95_percentile
FSNO21VA	-101.07	-118.28	-68.85
ARC-XCI55AX	-100.72	-119.03	-70.42
ASK-NCQ1338FA	-100.16	-118.02	-70.97
WNC-CR200A	-98.88	-117.58	-69.52
tracfone	-102.52	-121.31	-71.18
NCQ1338E	-101.1	-119	-69.46
ASK-NCQ1338	-100.24	-119.71	-70.1
Others	-82.444565	-112.84	-49.721775

Covariance: