

Client frequencies:

client\_0 freq: [1357 1480 1603 1726 1850 1973 2096 2220 2343 2466]  
client\_1 freq: [243 265 287 309 331 353 375 397 419 441]  
client\_2 freq: [3135 3420 3705 3990 4275 4560 4845 5130 5415 5700]  
client\_3 freq: [1970 2149 2328 2507 2686 2865 3045 3224 3403 3582]

	Accuracy	Loss
Norm	<div><pre>for i in range(len(pdfes)):     for j in range(i+1,len(pdfes)):         print(i," and ", j , stats.was</pre></div> <div>0 and 1 1.1316950932567083 0 and 2 16.789943005620493 0 and 3 9.708723438735062 1 and 2 17.892796430680484 1 and 3 10.80858591890214 2 and 3 7.084210511778343</div> <div>shape, loc, scale = stats.gamma.fit(gl pdf_global = stats.gamma.pdf(global_lo</div> <div><pre>for i in range(len(pdfes)):     print(i," and global: " , stats.wa</pre></div> <div>0 and global: 1751631362.9410932 1 and global: 1751631362.5086415 2 and global: 1751631376.031605 3 and global: 1751631370.533872</div>	<div><pre>for i in range(len(pdfes)):     for j in range(i+1,len(pdfes)):         print(i," and ", j , stats.wasserst</pre></div> <div>0 and 1 1.589712839613521 0 and 2 2.4618447346270234 0 and 3 1.2872063294604323 1 and 2 4.051557574240545 1 and 3 2.872169320055356 2 and 3 1.1793882541851883</div> <div>shape, loc, scale = stats.gamma.fit(global_ pdf_global = stats.gamma.pdf(global_loss_li</div> <div><pre>for i in range(len(pdfes)):     print(i," and global: " , stats.wassers</pre></div> <div>0 and global: 1751631362.639029 1 and global: 1751631363.1257498 2 and global: 1751631364.5361264 3 and global: 1751631363.6473703</div>
Gamma	<div><pre>print(i," and ", j , stats.wasserstein_</pre></div> <div>0 and 1 54717527503560.66 0 and 2 2619302465.973565 0 and 3 32223122.089287713 1 and 2 54714908201097.61 1 and 3 54717495280441.984 2 and 3 2587079344.469823</div> <div>shape, loc, scale = stats.gamma.fit(global_loss_ pdf_global = stats.gamma.pdf(global_loss_list, s</div> <div><pre>for i in range(len(pdfes)):     print(i," and global: " , stats.wasserstein</pre></div> <div>0 and global: 1751631312.3499918 1 and global: 54715775872251.2 2 and global: 867671153.9460524 3 and global: 1719408190.8830602</div>	<div>0 and 1 23293.67582116507 0 and 2 2642966087.701834 0 and 3 86836338.94386089 1 and 2 2642989381.0476484 1 and 3 86859632.27898744 2 and 3 2556129748.768661</div> <div>shape, loc, scale = stats.gamma.fit(global_ pdf_global = stats.gamma.pdf(global_loss_li</div> <div><pre>for i in range(len(pdfes)):     print(i," and global: " , stats.wassers</pre></div> <div>0 and global: 1751608069.7465165 1 and global: 1751631363.2008057 2 and global: 891358018.1219131 3 and global: 1664771762.0599706</div>
Lognorm	<div><pre>for i in range(len(pdfes)):     for j in range(i+1,len(pdfes)):         print(i," and ", j , stats.wasserste</pre></div> <div>0 and 1 55254380325754.164 0 and 2 16.07790006404852 0 and 3 9.049841030666352 1 and 2 55254380325751.23 1 and 3 55254380325752.18 2 and 3 7.04678114945583</div> <div>shape, loc, scale = stats.gamma.fit(global_l pdf_global = stats.gamma.pdf(global_loss_lis</div> <div><pre>for i in range(len(pdfes)):     print(i," and global: " , stats.wasserst</pre></div> <div>0 and global: 1751631363.2840414 1 and global: 55252628694393.89 2 and global: 1751631376.009677 3 and global: 1751631370.5441334</div>	<div>0 and 1 1.5962046520864261 0 and 2 1152032554.6114473 0 and 3 828319716.0062158 1 and 2 1152032555.8887386 1 and 3 828319717.1620903 2 and 3 323712838.75998193</div> <div>shape, loc, scale = stats.gamma.fit(global_loss_ pdf_global = stats.gamma.pdf(global_loss_list, s</div> <div><pre>for i in range(len(pdfes)):     print(i," and global: " , stats.wasserstein</pre></div> <div>0 and global: 1751631362.6457176 1 and global: 1751631363.124102 2 and global: 599598829.1823409 3 and global: 923311661.1644437</div>

Beta	<pre>for i in range(len(pdfs)):     for j in range(i+1,len(pdfs)):         print(i," and ", j , stats.wasserste</pre> <pre>0 and 1 472447182945.1053 0 and 2 1633923312858.529 0 and 3 30858645448885.793 1 and 2 1161476130514.6243 1 and 3 30386198265965.234 2 and 3 29224722136028.8</pre> <pre>shape, loc, scale = stats.gamma.fit(global_loss_list) pdf_global = stats.gamma.pdf(global_loss_list, loc=loc, scale=scale)  for i in range(len(pdfs)):     print(i," and global: " , stats.wasserst</pre> <pre>0 and global: 1751371635.8632 1 and global: 470695811311.50385 2 and global: 1632171941224.898 3 and global: 30856894077252.176</pre>	<pre>0 and 1 1326423760265.2085 0 and 2 2797271921268.4023 0 and 3 4987275998778.207 1 and 2 1470848161004.5254 1 and 3 3660852238514.3296 2 and 3 2190004078257.9138</pre> <pre>shape, loc, scale = stats.gamma.fit(global_loss_list) pdf_global = stats.gamma.pdf(global_loss_list, loc=loc, scale=scale)  for i in range(len(pdfs)):     print(i," and global: " , stats.wasserste</pre> <pre>0 and global: 17268452031.729095 1 and global: 1343692212296.3552 2 and global: 2814540373299.788 3 and global: 5004544450809.597</pre>
Burr	<pre>0 and 1 472447182945.1053 0 and 2 1633923312858.529 0 and 3 30858645448885.793 1 and 2 1161476130514.6243 1 and 3 30386198265965.234 2 and 3 29224722136028.8</pre> <pre>shape, loc, scale = stats.gamma.fit(global_loss_list) pdf_global = stats.gamma.pdf(global_loss_list, loc=loc, scale=scale)  for i in range(len(pdfs)):     print(i," and global: " , stats.wasser</pre> <pre>0 and global: 1751371635.8632 1 and global: 470695811311.50385 2 and global: 1632171941224.898 3 and global: 30856894077252.176</pre>	<pre>0 and 1 1326423760265.2085 0 and 2 2797271921268.4023 0 and 3 4987275998778.207 1 and 2 1470848161004.5254 1 and 3 3660852238514.3296 2 and 3 2190004078257.9138</pre> <pre>shape, loc, scale = stats.gamma.fit(global_loss_list) pdf_global = stats.gamma.pdf(global_loss_list, loc=loc, scale=scale)  for i in range(len(pdfs)):     print(i," and global: " , stats.wasserstein</pre> <pre>0 and global: 17268452031.729095 1 and global: 1343692212296.3552 2 and global: 2814540373299.788 3 and global: 5004544450809.597</pre>

# NON IID DISTRIBUTIONS (4 clients : gender-income)

client\_0 freq: [1973 2096 2220 2343 2466 2589 2713 2836 2959 3083]  
 client\_1 freq: [353 375 397 419 441 463 485 507 529 551]  
 client\_2 freq: [4560 4845 5130 5415 5700 5985 6270 6555 6840 7125]  
 client\_3 freq: [2865 3045 3224 3403 3582 3761 3940 4119 4298 4477]

Distribution	frequency	accuracy	Loss
Gamma	0 and 1 0.0034349427373413384 0 and 2 0.00042332799344532235 0 and 3 0.00023232772854376901 1 and 2 0.003858270730786661 1 and 3 0.003667270465885108 2 and 3 0.00019100026490155328  0 and global: 0.0005951170688163395 1 and global: 0.004030059806157678 2 and global: 0.00017178907537101712 3 and global: 0.00036278934027257045	0 and 1 96611745126.51799 0 and 2 26331468952.791576 0 and 3 10325938315.564121 1 and 2 70280276178.07014 1 and 3 86285806815.72081 2 and 3 16005530637.711647  0 and global: 71717033119.61592 1 and global: 24894712009.077194 2 and global: 45385564169.90277 3 and global: 61391094807.61442	0 and 1 3571334.6290192525 0 and 2 3527876.6556697614 0 and 3 3375884237.1164727 1 and 2 43488.81355166581 1 and 3 3379455571.689611 2 and 3 3379412087.511244  0 and global: 100025094.95119059 1 and global: 103596429.5762785 2 and global: 103552956.95220673 3 and global: 3275859142.165282
Norm	0 and 1 0.003434916180979071 0 and 2 0.00042333433612756695 0 and 3 0.00023233377600585708 1 and 2 0.0038582505171066376 1 and 3 0.003667249956984929 2 and 3 0.00019100056012170982  0 and global: 0.0005951218430858042 1 and global: 0.004030038024064876 2 and global: 0.00017178750695823704 3 and global: 0.00036278806707994697	0 and 1 1.8533511277924637 0 and 2 12.550186731287384 0 and 3 8.844801561217773 1 and 2 14.389581675430298 1 and 3 10.680811536495323 2 and 3 3.7087701389349754  0 and global: 45.57258011544753 1 and global: 47.41197505959046 2 and global: 33.02239338416016 3 and global: 36.73116352309513	0 and 1 1.9439247483985005 0 and 2 2.2940469778074366 0 and 3 1.3069255004588132 1 and 2 4.237971726205937 1 and 3 3.2498012081393775 2 and 3 0.9881705180665596  0 and global: 4.964483702557023 1 and global: 6.908408450955523 2 and global: 2.7417408911300143 3 and global: 3.658607242816146

Lognorm	0 and 1 5660592.193859114 0 and 2 58726.068773617095 0 and 3 58834.618926491945 1 and 2 5719318.262632731 1 and 3 5719426.812785607 2 and 3 108.55021695542531  0 and global: 59708.31306807256 1 and global: 5720300.506927187 2 and global: 982.244294455473 3 and global: 873.6941415806158	0 and 1 3463538508071.1514 0 and 2 11.92890537244354 0 and 3 8.301989770435537 1 and 2 3463538508076.3716 1 and 3 3463538508074.5317 2 and 3 3.637997000153498  0 and global: 45.35031292556467 1 and global: 3463538508096.0435 2 and global: 33.440059079099576 3 and global: 37.078056079253074	0 and 1 1.9443768895059936 0 and 2 42.594144025410536 0 and 3 198758847484.76242 1 and 2 44.479917786526045 1 and 3 198758847485.8803 2 and 3 198758847476.48886  0 and global: 6.273941466842511 1 and global: 8.218318356348504 2 and global: 36.908357975239106 3 and global: 198758847483.9256
Beta	0 and 1 0.0037600727311337865 0 and 2 0.0010872173535729818 0 and 3 0.0007812811823525462 1 and 2 0.004730229869492611 1 and 3 0.004424293698272176 2 and 3 0.0003059361712204356  0 and global: 0.0013583023787272718 1 and global: 0.0050013148946469015 2 and global: 0.00027108502515429 3 and global: 0.0005770211963747256	0 and 1 854113097152899.4 0 and 2 23350576942951.473 0 and 3 28716477394886.68 1 and 2 830762520209948.1 1 and 3 825396619758256.6 2 and 3 5365900451935.387  0 and global: 142560324721048.28 1 and global: 711552772431869.8 2 and global: 119209747778098.02 3 and global: 113843847326399.7	0 and 1 1668988051430.631 0 and 2 33993429924.851116 0 and 3 5102665534436.631 1 and 2 1702981481355.2244 1 and 3 3433677483008.0156 2 and 3 5136658964360.713  0 and global: 36162306096.86395 1 and global: 1705150357527.4949 2 and global: 2168876172.2707167 3 and global: 5138827840527.401
Burr	0 and 1 0.0033262394877202617 0 and 2 0.00040832023076190096 0 and 3 0.00022358570628453592 1 and 2 0.003734559718482163 1 and 3 0.003549825194004798 2 and 3 0.00018473452447736509  0 and global: 0.0005744299617219128 1 and global: 0.0039006694494421747 2 and global: 0.00016610973096001176 3 and global: 0.0003508442554373769	0 and 1 802754617320.8098 0 and 2 40.223243866821676 0 and 3 45.69219771091308 1 and 2 802754617348.5286 1 and 3 802754617351.9719 2 and 3 7.6786916197144635  0 and global: 43.05023143195532 1 and global: 802754617350.6935 2 and global: 3.4811377511131445 3 and global: 5.862382991576778	0 and 1 0.972495068914641 0 and 2 29.11436567242299 0 and 3 24.301778376477447 1 and 2 29.84226937755347 1 and 3 24.928362496047953 2 and 3 4.9139068815055165  0 and global: 4.580701327257708 1 and global: 5.459503317743751 2 and global: 25.287826120400084 3 and global: 20.688757770350925

Single-Batch Distributions

**client\_0**  
loss: [0.04675943 0.22334448 0.3253662 0.3327828 0.32753864 0.30964363 0.30064547 0.2881389 0.30844659 0.29107651]  
freq: [7895 7895 7895 7895 7895 7895 7895 7895 7895 7895]  
acc [0.99366689 0.91247624 0.87321091 0.86865103 0.87473083 0.8781507 0.88081062 0.88777709 0.87941736 0.88448387]  
**client\_1**  
loss: [0.44730943 1.00544584 1.24900603 1.09015918 1.2009567 1.20884359 1.11642206 1.12442636 1.07541847 1.10691833]  
freq: [1435 1435 1435 1435 1435 1435 1435 1435 1435 1435]  
acc [0.89128917 0.49756098 0.37770036 0.50522649 0.44808361 0.43135887 0.47804877 0.47456446 0.50662023 0.48989546]  
**client\_2**  
loss: [0.03972216 0.02067855 0.01909248 0.02059607 0.02184644 0.02210405 0.0240159 0.02484704 0.02478325 0.02511534]  
freq: [18259 18259 18259 18259 18259 18259 18259 18259 18259 18259]  
acc [0.99611151 0.99989045 1. 1. 1. 0.99994522 0.99994522 0.99989045 0.99989045 0.99994522]  
**client\_3**  
loss: [0.10719391 0.02389912 0.0262641 0.02447494 0.02615622 0.02859946 0.0283988 0.02978892 0.03104771 0.03117665]  
freq: [11484 11484 11484 11484 11484 11484 11484 11484 11484 11484]  
acc [0.98885405 0.99965167 0.99982584 0.99991292 0.99991292 0.99991292 0.99982584 0.99982584 0.99973875 0.99973875]

Distribution	Accuracy	Loss
Gamma	0 and 1 5052963785.6386385	0 and 1 9.308714649162779
	0 and 2 110213288418.12776	0 and 2 11341.601002166437
	0 and 3 107785490295.07877	0 and 3 4854633.798060776
	1 and 2 105160324655.85822	1 and 2 11337.843632987884
	1 and 3 102732526518.81839	1 and 3 4854630.040691596
	2 and 3 2427798137.039818	2 and 3 4843350.173976158
	0 and global: 2170527.9642331777	0 and global: 6.269837293033752
	1 and global: 5050793767.680869	1 and global: 13.414506742209406
	2 and global: 110211118394.07294	2 and global: 11335.51733712475
	3 and global: 107783320275.70663	3 and global: 4854628.48416662
Norm	0 and 1 6.675711374677921	0 and 1 2.4057410423621155
	0 and 2 286.15857542033956	0 and 2 54.555577640223106
	0 and 3 94.18641588484508	0 and 3 10.220130044593963
	1 and 2 292.8342867950175	1 and 2 56.96131868258523
	1 and 3 100.86212725952299	1 and 3 12.62587108695608
	2 and 3 191.97215953549448	2 and 3 44.33544759562915
	0 and global: 1091.4961367516255	0 and global: 6.002736887598183
	1 and global: 1098.1718481263035	1 and global: 8.408477929960299
	2 and global: 805.337561331286	2 and global: 49.369079300209755
	3 and global: 997.3097208667805	3 and global: 5.281169731086335

Lognorm	<div>0 and 1 20.848571350665924</div> <div>0 and 2 68.43472489365098</div> <div>0 and 3 78.13086556288947</div> <div>1 and 2 89.2832962443169</div> <div>1 and 3 98.97943691355539</div> <div>2 and 3 84.68423389603093</div> <div>0 and global: 1078.2990797532764</div> <div>1 and global: 1099.1476511039423</div> <div>2 and global: 1015.7192759065204</div> <div>3 and global: 1000.1682141903868</div>	<div>0 and 1 2.396580615537854</div> <div>0 and 2 88.29790770059965</div> <div>0 and 3 79.39303651314505</div> <div>1 and 2 90.69448831613751</div> <div>1 and 3 81.7896171286829</div> <div>2 and 3 32.77755483496762</div> <div>0 and global: 6.029857038491165</div> <div>1 and global: 8.426437654029018</div> <div>2 and global: 82.74258355514098</div> <div>3 and global: 74.39622381424006</div>
Beta	<div>0 and 1 1521748664975.6758</div> <div>0 and 2 210969340692530.25</div> <div>0 and 3 30110798953388.42</div> <div>1 and 2 212491089357505.84</div> <div>1 and 3 31632547618362.84</div> <div>2 and 3 180858541739143.1</div> <div>0 and global: 308744075720725.44</div> <div>1 and global: 310265824385701.06</div> <div>2 and global: 385995910701328.75</div> <div>3 and global: 325709730121620.6</div>	<div>0 and 1 2314866766485.9023</div> <div>0 and 2 10624594890126.223</div> <div>0 and 3 4839861950005.761</div> <div>1 and 2 12939461656612.125</div> <div>1 and 3 7154728716486.841</div> <div>2 and 3 5784732940125.554</div> <div>0 and global: 4391291160872.917</div> <div>1 and global: 2076424394391.9973</div> <div>2 and global: 15015886050987.99</div> <div>3 and global: 9231153110878.678</div>
Burr	<div>0 and 1 12.557451473326129</div> <div>0 and 2 73.81034375812625</div> <div>0 and 3 58.98077024145226</div> <div>1 and 2 86.36779523145239</div> <div>1 and 3 71.5382217147784</div> <div>2 and 3 14.82957351667399</div> <div>0 and global: 37.68286544026416</div> <div>1 and global: 50.24031691359029</div> <div>2 and global: 36.12747831786209</div> <div>3 and global: 30.816360768026254</div>	<div>0 and 1 5.9800054838741215</div> <div>0 and 2 85.11174054509708</div> <div>0 and 3 14009025718706.021</div> <div>1 and 2 91.09174602897119</div> <div>1 and 3 14009025718712.0</div> <div>2 and 3 14009025718739.184</div> <div>0 and global: 2.2096049476649746</div> <div>1 and global: 7.564232292959562</div> <div>2 and global: 83.77601115000714</div> <div>3 and global: 14009025718705.12</div>

**NON IID DISTRIBUTIONS (8 clients : gender-race(white/black)-income)**

client\_ 0 freq: [154 173 193 212 231 250 270 289 308 327]  
client\_ 1 freq: [12 13 15 16 17 19 20 22 23 24]  
client\_ 2 freq: [1148 1291 1435 1578 1722 1865 2009 2152 2295 2439]  
client\_ 3 freq: [214 241 268 294 321 348 375 401 428 455]  
client\_ 4 freq: [ 900 1013 1125 1238 1350 1463 1575 1688 1800 1913]  
client\_ 5 freq: [42 47 52 57 62 68 73 78 83 88]  
client\_ 6 freq: [1921 2168 2415 2661 2908 3154 3401 3647 3894 4140]  
client\_ 7 freq: [1504 1529 1553 1577 1602 1626 1650 1675 1699 1724]

Distribution	frequency	accuracy	Loss
Gamma	0 and 1 0.061555536385285624	0 and 1 3.5001817549856585e+23	0 and 1 0.22051657214227194
	0 and 2 0.0041382116829178405	0 and 2 7869143271.861214	0 and 2 14774694.28399596
	0 and 3 0.0013400631914867798	0 and 3 357034.07862304547	0 and 3 4717296587.966944
	0 and 4 0.003961905318923298	0 and 4 518126.9362475103	0 and 4 1661033.0837199779
	0 and 5 0.013010983461184001	0 and 5 165104.89760287738	0 and 5 0.1598046861121252
	0 and 6 0.004406344593409131	0 and 6 19103681246.857594	0 and 6 31.63787434757529
	0 and 7 0.00100519614650254	0 and 7 392016643.4018573	0 and 7 4686093.701512583
	1 and 2 0.06569374806820347	1 and 2 3.50018175498558e+23	1 and 2 14774694.504512532
	1 and 3 0.0628955995767724	1 and 3 3.5001817549856585e+23	1 and 3 4717296588.187131
	1 and 4 0.06551744170420892	1 and 4 3.5001817549856585e+23	1 and 4 1661033.0432750282
	1 and 5 0.048544552924101626	1 and 5 3.5001817549856585e+23	1 and 5 0.06072497058341592
	1 and 6 0.06596188097869476	1 and 6 3.500181754985467e+23	1 and 6 31.858060977126417
	1 and 7 0.06256073253178818	1 and 7 3.500181754985655e+23	1 and 7 4686093.921699212
	2 and 3 0.0027981484914310598	2 and 3 7868786239.209446	2 and 3 4702521897.798205
	2 and 4 0.00017630636399454234	2 and 4 7868625147.615849	2 and 4 13113661.556582669
	2 and 5 0.01714919514410184	2 and 5 7869231109.581604	2 and 5 14774694.443800645
	2 and 6 0.0002681329104912907	2 and 6 11234537976.059536	2 and 6 14774665.688301405
	2 and 7 0.0031330155364153	2 and 7 7477126628.530401	2 and 7 10088608.07593358
	3 and 4 0.002621842127436518	3 and 4 161100.1784975285	3 and 4 4715635555.235035
	3 and 5 0.014351046652670783	3 and 5 444871.7990126755	3 and 5 4717296588.126406
	3 and 6 0.00306628140192235	3 and 6 19103324215.268982	3 and 6 4717296562.071834
	3 and 7 0.00033486704498423994	3 and 7 391659611.30970186	3 and 7 4712610502.249417
	4 and 5 0.016972888780107297	4 and 5 605962.197813923	4 and 5 1661033.0135691038
	4 and 6 0.0004444392744858331	4 and 6 19103163122.99236	4 and 6 1661030.5133884917
	4 and 7 0.002956709172420758	4 and 7 391498519.3510584	4 and 7 3025060.9600235075
	5 and 6 0.017417328054593128	5 and 6 19103769084.577984	5 and 6 31.797336006543002
	5 and 7 0.014016179607686542	5 and 7 392104481.1222469	5 and 7 4686093.860974241
	6 and 7 0.003401148446906591	6 and 7 18711664603.959282	6 and 7 4686063.665686254
	0 and global: 0.004620694721391866	0 and global: 41259533824.28781	0 and global: 7654705523.434952
	1 and global: 0.0661762311066775	1 and global: 3.5001817549852465e+23	1 and global: 7654705523.655138
	2 and global: 0.00048248303847402575	2 and global: 33390390564.280167	2 and global: 7639930862.044109
	3 and global: 0.0032806315299050855	3 and global: 41259176803.48961	3 and global: 2937408981.9449573
	4 and global: 0.000658789402468568	4 and global: 41259015707.19073	4 and global: 7653044490.611863
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Norm	0 and 1 0.06155314818732709 0 and 2 0.0041382495420010145 0 and 3 0.0013401049330001278 0 and 4 0.003961938678467752 0 and 5 0.013011209351361921 0 and 6 0.004406379243408383 0 and 7 0.001005243975558933 1 and 2 0.06569139772932811 1 and 3 0.06289325312032723 1 and 4 0.06551508686579485 1 and 5 0.048541938835965165 1 and 6 0.06595952743073548 1 and 7 0.06255839216288603 2 and 3 0.0027981446090008864 2 and 4 0.00017631086353326104 2 and 5 0.017149458893362935 2 and 6 0.0002681297014073686 2 and 7 0.0031330055664420815 3 and 4 0.002621833745467625 3 and 5 0.014351314284362048 3 and 6 0.0030662743104082546 3 and 7 0.000334860957441195 4 and 5 0.01697314802982967 4 and 6 0.00044444056494062964 4 and 7 0.0029566947029088203 5 and 6 0.017417588594770304 5 and 7 0.014016453326920853 6 and 7 0.0034011352678494497  0 and global: 0.0046207285698786765 1 and global: 0.06617387675720578 2 and global: 0.0004824790278776623 3 and global: 0.003280623636878548 4 and global: 0.0006587898914109234 5 and global: 0.017631937921240598 6 and global: 0.0002143493264702938 7 and global: 0.003615484594319744	0 and 1 0.8325300686638157 0 and 2 10.459736423104237 0 and 3 1.698031063319809 0 and 4 0.6592378845059876 0 and 5 0.42290213571143564 0 and 6 18.528715177097837 0 and 7 13.219825443615902 1 and 2 9.627206354440421 1 and 3 0.8655009946559932 1 and 4 0.32002245930806605 1 and 5 0.4096279329523801 1 and 6 17.696185108434015 1 and 7 12.387295374952084 2 and 3 8.761705359784427 2 and 4 9.800498538598248 2 and 5 10.036834287392804 2 and 6 8.068978753993596 2 and 7 2.7600890205116646 3 and 4 1.0479685475623837 3 and 5 1.275128927608373 3 and 6 16.830684113778027 3 and 7 11.521794380296091 4 and 5 0.41552401074085465 4 and 6 17.86947729259185 4 and 7 12.560587559109912 5 and 6 18.105813041386398 5 and 7 12.796923307904466 6 and 7 5.308889733481931  0 and global: 116.55554794469576 1 and global: 115.72301787603195 2 and global: 106.09581152159153 3 and global: 114.85751688137596 4 and global: 115.89631006018978 5 and global: 116.13264580898432 6 and global: 98.02683276759791 7 and global: 103.33572250107987	0 and 1 0.2263963719578554 0 and 2 2.4129205474004163 0 and 3 1.2704907536330314 0 and 4 1.4787686693468602 0 and 5 0.16566362160853892 0 and 6 3.7632501494387287 0 and 7 2.9819330218239486 1 and 2 2.6393169193582717 1 and 3 1.496887125590887 1 and 4 1.7051650413047155 1 and 5 0.060732750349316474 1 and 6 3.9896465213965846 1 and 7 3.208329393781804 2 and 3 1.1424297937673844 2 and 4 0.9375641506137123 2 and 5 2.578584169008955 2 and 6 1.3503296020383129 2 and 7 0.569012474423533 3 and 4 0.3000020347142675 3 and 5 1.4361543752415704 3 and 6 2.492759395805697 3 and 7 1.7114422681909174 4 and 5 1.6444322909553992 4 and 6 2.2844814800918685 4 and 7 1.5031643524770888 5 and 6 3.9289137710472675 5 and 7 3.1475966434324874 6 and 7 0.7813171276147799  0 and global: 14.191481446599221 1 and global: 14.417877818557077 2 and global: 11.778560899198805 3 and global: 12.92099069296619 4 and global: 12.71271277725236 5 and global: 14.357145068207759 6 and global: 10.428231297160492 7 and global: 11.20954842477527
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Beta	0 and 1 2.220652626228219 0 and 2 0.004581367677561024 0 and 3 0.0015114701017898443 0 and 4 0.1363751875820617 0 and 5 0.4612214831003908 0 and 6 1.582322789238371 0 and 7 0.0016017589952226825 1 and 2 2.22523399390578 1 and 3 2.222164096330009 1 and 4 2.0921404591245185 1 and 5 1.7594311431278284 1 and 6 0.6479308183370217 1 and 7 2.2222543852234415 2 and 3 0.003069897575771181 2 and 4 0.13309353478126132 2 and 5 0.4658028507779518 2 and 6 1.577923770185364 2 and 7 0.0037003509509938998 3 and 4 0.13509929088577144 3 and 5 0.46273295320218066 3 and 6 1.5808919225642308 3 and 7 0.0006908274096867855 4 and 5 0.33270931599669057 4 and 6 1.4459476016563093 4 and 7 0.13574246307004081 5 and 6 1.1500988775360375 5 and 7 0.4628232420956135 6 and 7 1.581569714172193  0 and global: 0.005978573520716108 1 and global: 2.226631199748935 2 and global: 0.0013972058431550838 3 and global: 0.0044671034189262635 4 and global: 0.13449074062441638 5 and global: 0.4672000566211069 6 and global: 1.5787003814119134 7 and global: 0.004376814525493426	0 and 1 7.307236233053098e+28 0 and 2 37600461648677.42 0 and 3 48198812766773.0 0 and 4 48968916937776.31 0 and 5 48844505240609.46 0 and 6 48978053403745.07 0 and 7 44051455739019.99 1 and 2 7.307236233053103e+28 1 and 3 7.3072362330531045e+28 1 and 4 7.307236233053104e+28 1 and 5 7.307236233053104e+28 1 and 6 7.307236233053104e+28 1 and 7 7.307236233053102e+28 2 and 3 10598351118113.635 2 and 4 11368455289108.766 2 and 5 11244043591950.123 2 and 6 11377591755067.637 2 and 7 6450994090353.064 3 and 4 770104171003.5665 3 and 5 645692473836.4873 3 and 6 779240636972.3181 3 and 7 4147357027763.732 4 and 5 124411697167.80614 4 and 6 9136465968.751783 4 and 7 4917461198761.089 5 and 6 133548163136.5579 5 and 7 4793049501600.219 6 and 7 4926597664725.075  0 and global: 238239896020545.4 1 and global: 7.307236233053075e+28 2 and global: 275840357669204.75 3 and global: 286438708787318.3 4 and global: 287208812958313.2 5 and global: 287084401261154.9 6 and global: 287217949424196.9 7 and global: 282291351759554.6	0 and 1 353086513869.58966 0 and 2 625704185007.5367 0 and 3 601345396248.4308 0 and 4 612308990252.4236 0 and 5 170051563451.07916 0 and 6 9619369512165.635 0 and 7 626150273442.9197 1 and 2 272617671156.7146 1 and 3 248258882397.76105 1 and 4 259222476400.81454 1 and 5 183034950419.6448 1 and 6 9972456026023.438 1 and 7 273063759591.8211 2 and 3 24358788759.46 2 and 4 13395194756.100967 2 and 5 455652621559.27655 2 and 6 10245073697172.484 2 and 7 446088435.6647787 3 and 4 10963594005.57126 3 and 5 431293832800.351 3 and 6 10220714908413.885 3 and 7 24804877195.124775 4 and 5 442257426803.36224 4 and 6 10231678502416.443 4 and 7 13841283191.108635 5 and 6 9789421075613.766 5 and 7 456098709994.3831 6 and 7 10245519785607.215  0 and global: 625549346868.8162 1 and global: 272462833009.92758 2 and global: 154838164.6307743 3 and global: 24203950621.944965 4 and global: 13240356616.392603 5 and global: 455497783417.7913 6 and global: 10244918859015.127 7 and global: 600926599.3623089

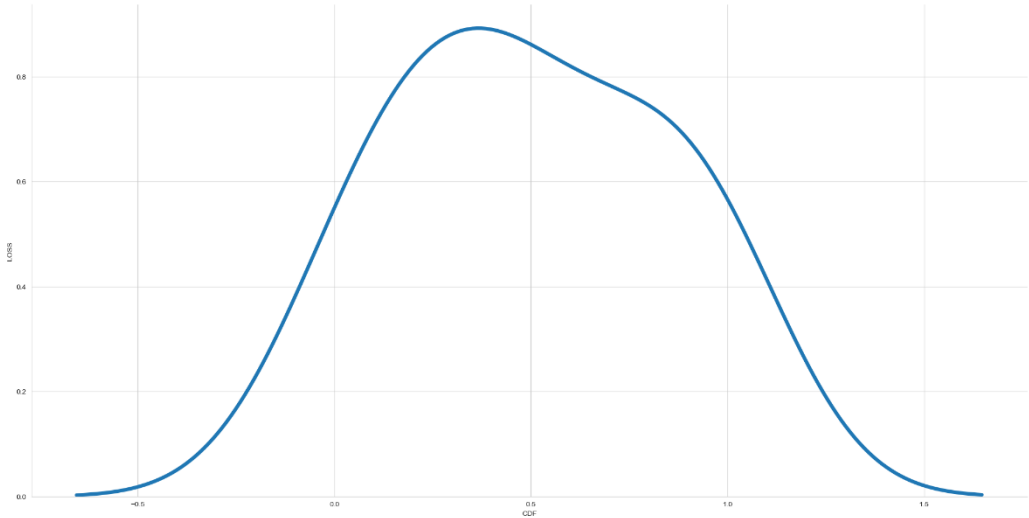
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	0 and 3 0.001160969409141201	0 and 3 41444361615596.75	0 and 3 nan
	0 and 4 0.00367676196969297	0 and 4 41444361615607.33	0 and 4 nan
	0 and 5 0.012969043801782994	0 and 5 4.481935523269599e+19	0 and 5 nan
	0 and 6 0.0041010915149884775	0 and 6 41444361615584.23	0 and 6 nan
	0 and 7 0.0007704665972037736	0 and 7 41444361615585.336	0 and 7 nan
	1 and 2 0.07256791610335224	1 and 2 9.632467572128622e+27	1 and 2 nan
	1 and 3 0.06988484302382439	1 and 3 9.632467572128622e+27	1 and 3 nan
	1 and 4 0.07240063558437616	1 and 4 9.632467572128622e+27	1 and 4 nan
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	3 and 7 0.0003958053079826416	3 and 7 20.050108732150733	3 and 7 811282.6256697116
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	4 and global: 0.0006282463682185201	4 and global: 48.97863677047325	4 and global: 16.234427795312904
	5 and global: 0.01727405213969448	5 and global: 4.481939667705761e+19	5 and global: 17.88514725100624
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	7 and global: 0.0035345417407077174	7 and global: 16.239135195002564	7 and global: 28306.207042509108

**Non-IID distribution for a 10-client system using repaired (sensitive attributes dropped) data for training/ server side repairing**

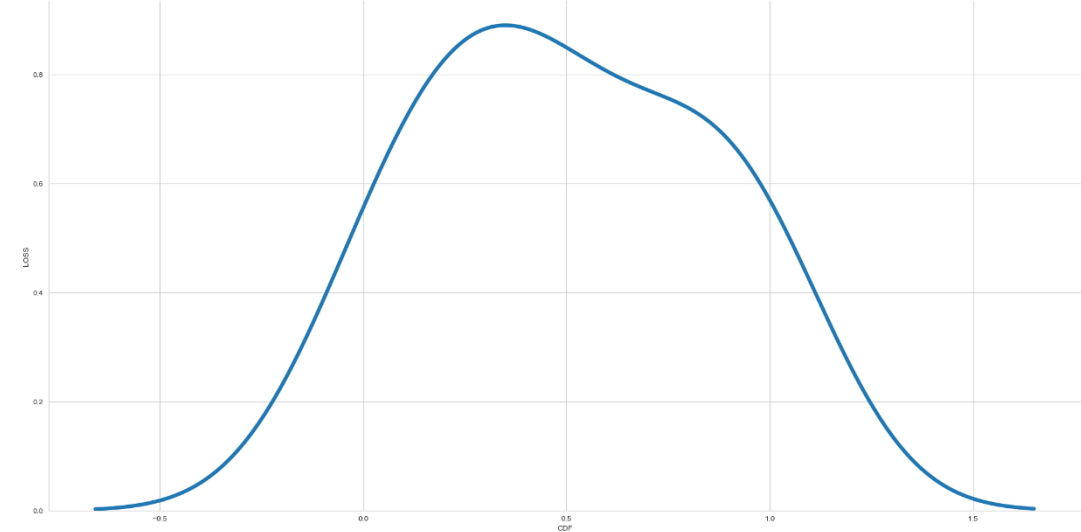
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CDFs for losses for individual clients:

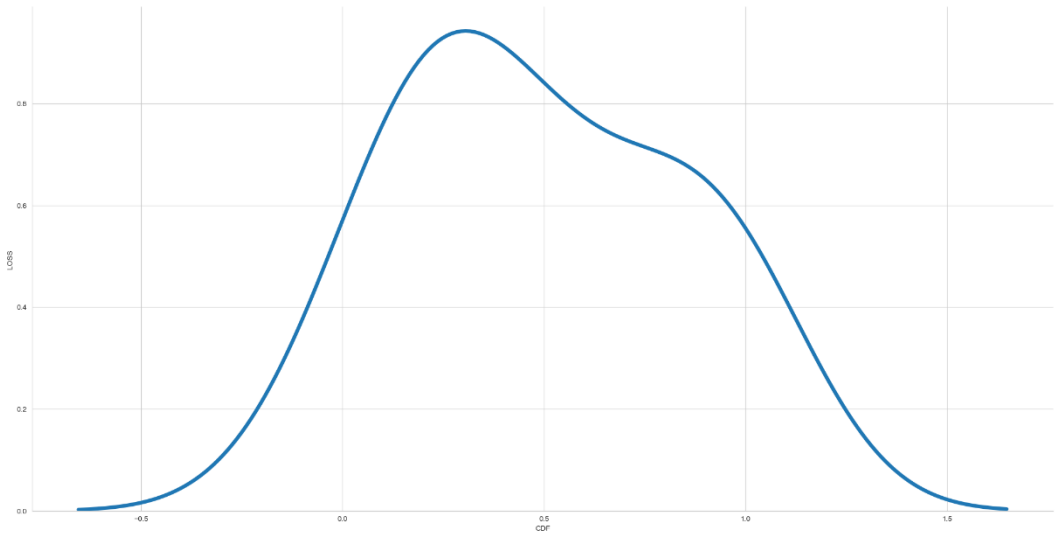
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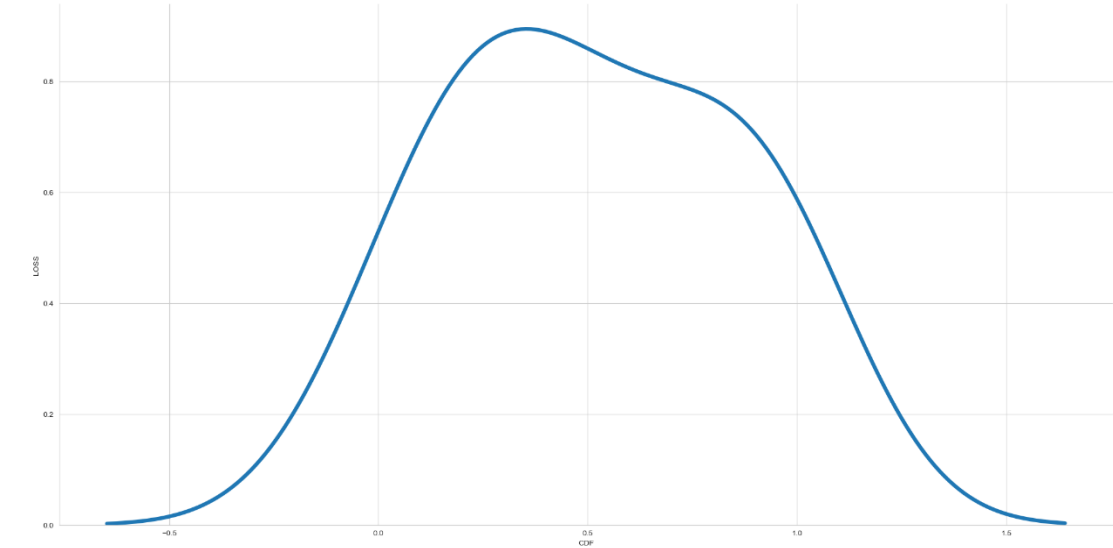
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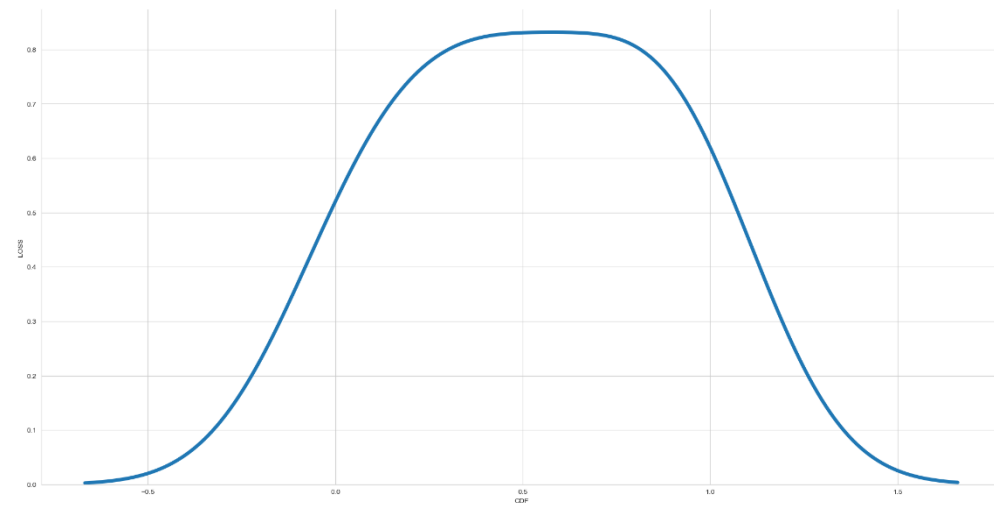
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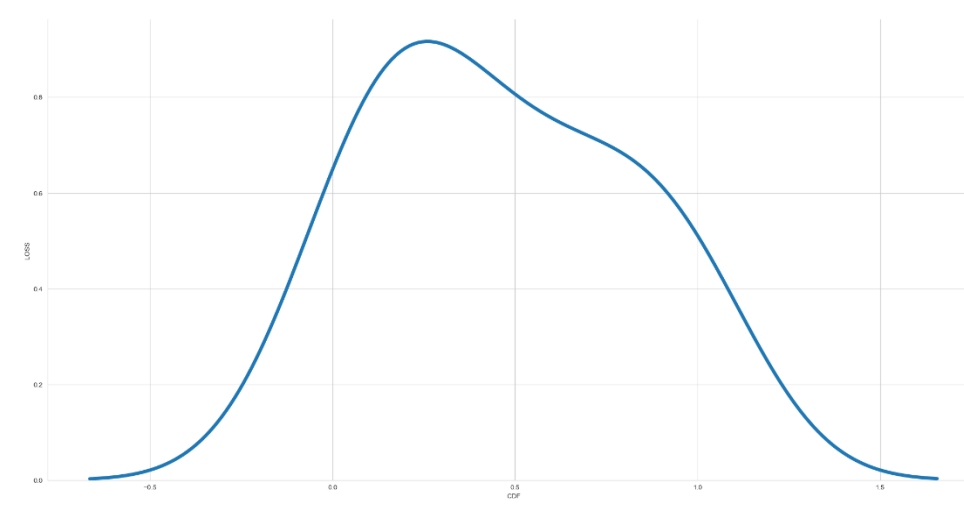
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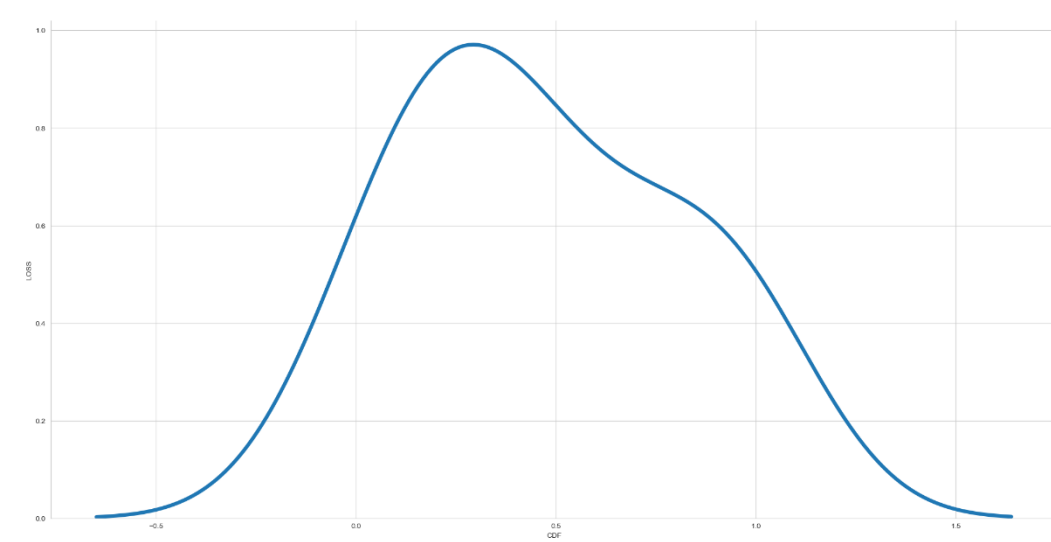
client\_4



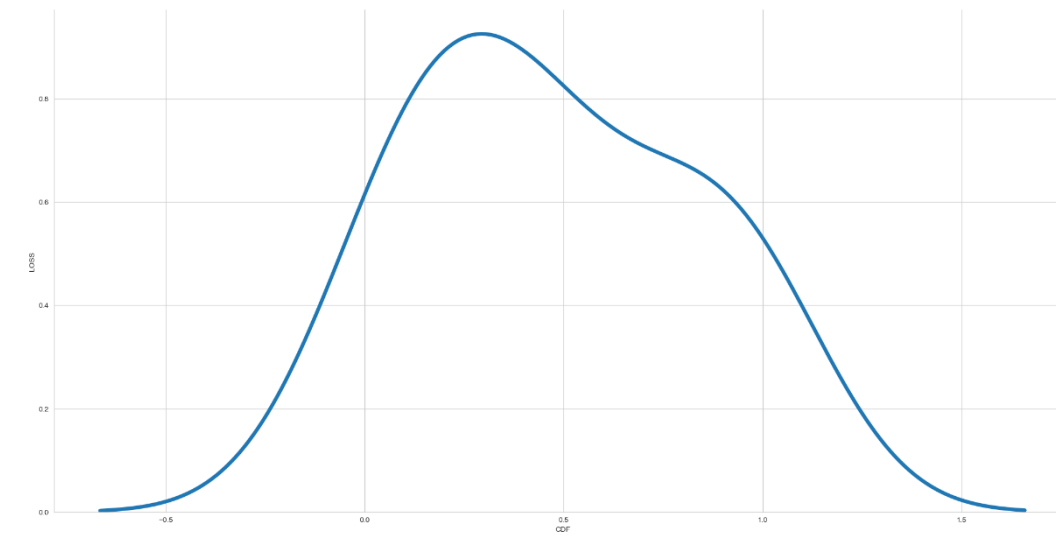
client\_5



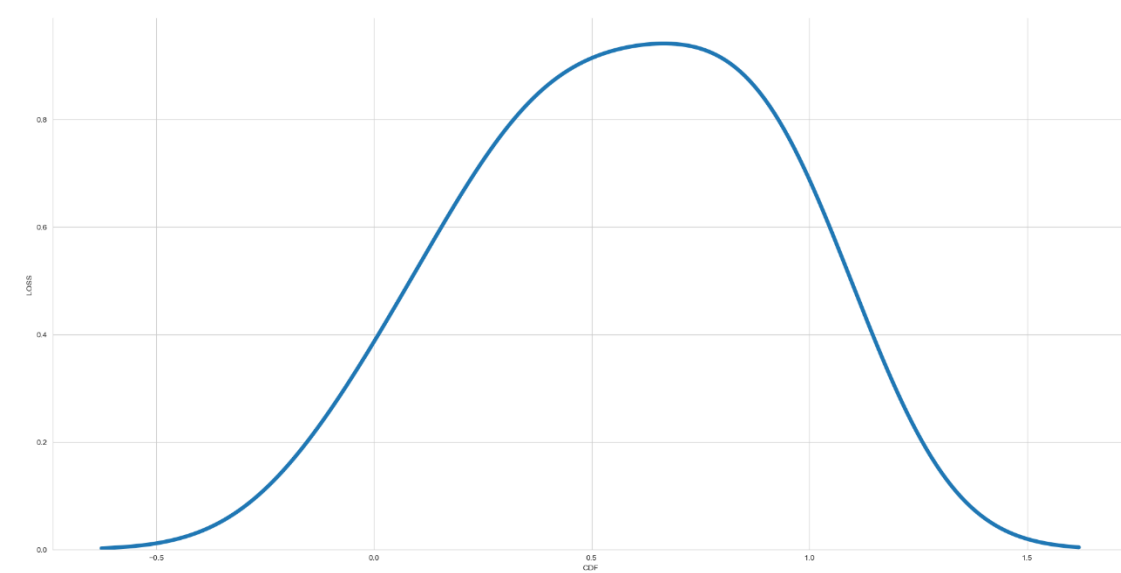
client\_6



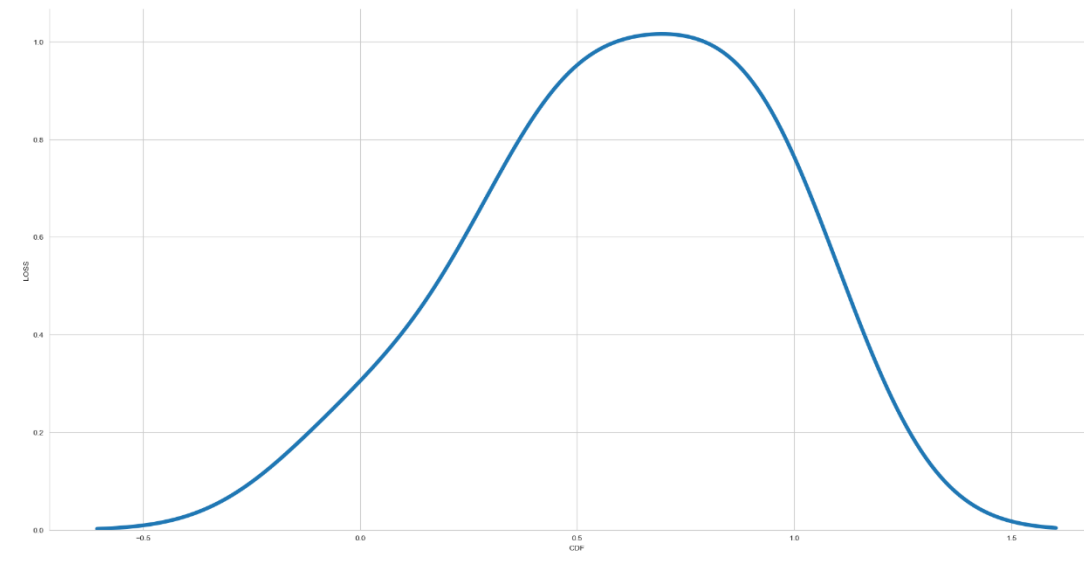
client\_7



client\_8



client\_9



## Statistics:

### ***client\_0***

loss: [0.61086375 0.48895925 0.42192078 0.38538462 0.36777058 0.35811067 0.35217971 0.34762534 0.34223405 0.34042257]

freq: [ 34 63 89 99 135 136 155 198 253 310]

acc [0.68465227 0.80593437 0.82598567 0.83244336 0.83575219 0.83884007 0.84030771 0.84148592 0.84315759 0.84329736]

### ***client\_1***

loss: [0.60810548 0.49124789 0.42425817 0.38594407 0.36823279 0.35871762 0.35395196 0.34909132 0.34512201 0.34348699]

freq: [ 38 72 80 100 154 175 210 265 301 304]

acc [0.6895178 0.80177778 0.82569444 0.83469224 0.83653253 0.83756828 0.83787876 0.83998203 0.84094632 0.84125489]

### ***client\_2***

loss: [0.62629861 0.5121786 0.42389324 0.38565096 0.36983481 0.3597762 0.35359699 0.35081801 0.35046026 0.34585956]

freq: [ 26 28 61 119 128 167 202 222 248 308]

acc [0.64890963 0.78917378 0.81968504 0.83105296 0.83345747 0.83466476 0.83621299 0.83674204 0.83647132 0.83981413]

### ***client\_3***

loss: [0.5920248 0.47583362 0.42313868 0.3866969 0.37091368 0.36190581 0.35488188 0.35127825 0.34916413 0.34639987]

freq: [ 49 102 104 119 124 138 185 201 215 265]

acc [0.70891088 0.80850899 0.8235566 0.83092368 0.83423078 0.83580887 0.83733851 0.83866507 0.83899999 0.83986813]

### ***client\_4***

loss: [0.65826589 0.5169788 0.42765966 0.38794741 0.36735302 0.35774747 0.35061172 0.34742814 0.34490946 0.34517193]

freq: [ 11 26 53 78 123 172 209 224 249 315]

acc [0.6068182 0.78535825 0.82666665 0.83210254 0.83792883 0.84053552 0.84220952 0.84236926 0.84271133 0.84184933]

### ***client\_5***

loss: [0.61959428 0.48596308 0.40170121 0.37713358 0.3615804 0.35094073 0.34597063 0.34304726 0.34170884 0.34019074]

freq: [ 31 74 155 190 254 301 345 408 456 501]

acc [0.66692913 0.80526882 0.82871795 0.83496648 0.83968699 0.84224683 0.84266943 0.84290451 0.84317309 0.84325564]

### ***client\_6***

loss: [0.63035935 0.5015859 0.4151603 0.3802737 0.36296323 0.35536006 0.35027575 0.3468076 0.34330562 0.34104306]

freq: [ 23 48 91 135 164 209 225 248 287 306]

acc [0.6536842 0.79149997 0.83095866 0.83722717 0.84047621 0.84233409 0.84359521 0.84452999 0.84544194 0.84531045]

### ***client\_7***

loss: [0.67178184 0.51838964 0.42784214 0.38460797 0.36651531 0.358017 0.35256788 0.34676394 0.34442586 0.34205738]

freq: [ 2 27 40 91 124 172 187 232 261 263]

acc [0.60666668 0.79030305 0.82404041 0.83298153 0.83513516 0.8371706 0.83821654 0.83956194 0.84028029 0.84116048]

### ***client\_8***

loss: [0.58725697 0.49155888 0.41370627 0.38253722 0.36716944 0.35897282 0.35035193 0.34639585 0.34351107 0.34077337]

freq: [ 51 64 112 133 145 158 187 200 215 222]

acc [0.71806854 0.80588973 0.82985073 0.83530468 0.83838552 0.83816719 0.84089172 0.84224343 0.84337038 0.84474343]

### ***client\_9***

loss: [0.58318889 0.45914096 0.40776464 0.37675032 0.36124367 0.35230872 0.34864539 0.3455101 0.34278136 0.34076509]

freq: [ 50 120 150 182 203 236 270 287 310 311]

acc [0.72603172 0.8139165 0.82998937 0.8375383 0.84057969 0.84284753 0.84299177 0.84381586 0.84391373 0.84510106]

Wasserstein distances using cdfs obtained by Gauss Distribution

FREQUENCY		
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0	and	2 0.05905889378110912
0	and	3 0.06010973946227704
0	and	4 0.06992996869099012
0	and	5 0.046182048403765136
0	and	6 0.05193517557023589
0	and	7 0.06888461062958612
0	and	8 0.04853586469820127
0	and	9 0.04854032281454009
1	and	2 0.04800968023567024
1	and	3 0.06807515627193718
1	and	4 0.04009617256871384
1	and	5 0.028330873449552908
1	and	6 0.043004796816411985
1	and	7 0.027801567806504713
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