Test các mức Non-IID khác nhau để xác định xem việc mất cân bằng dữ liệu sẽ ảnh hưởng đến độ chính xác như thế nào?

Kịch bản: 20 round, 10 client, chọn ngẫu nhiên 4 client mỗi round

1. **Bắt đầu xét từ 80% Non-IID**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| % Non-IID | 80 | 81 | 82 | 83 | 84 |
| Acc |  | 0.9778 | 0.9765 |  |  |
| % Non-IID | 85 | 86 | 87 | 88 | 89 |
| Acc | 0.9713 |  |  |  | 0.9085 |
| % Non-IID | 90 | 91 | 92 | 93 | 94 |
| Acc | 0.1943 | 0.1191 |  |  |  |
| % Non-IID | 95 | 96 | 97 | 98 | 99 |
| Acc |  |  |  |  |  |

'accuracy81': [(0, 0.0924), (1, 0.3307), (2, 0.8552), (3, 0.9219), (4, 0.9415), (5, 0.946), (6, 0.9575), (7, 0.9572), (8, 0.9588), (9, 0.9608), (10, 0.9647), (11, 0.9698), (12, 0.9733), (13, 0.9719), (14, 0.974), (15, 0.9743), (16, 0.9751), (17, 0.9729), (18, 0.9778), (19, 0.9773), (20, 0.9768)]

'accuracy82': [(0, 0.0963), (1, 0.4454), (2, 0.8276), (3, 0.9114), (4, 0.9358), (5, 0.9453), (6, 0.9547), (7, 0.9632), (8, 0.9599), (9, 0.9636), (10, 0.9674), (11, 0.9638), (12, 0.9706), (13, 0.9686), (14, 0.9726), (15, 0.9755), (16, 0.9743), (17, 0.9734), (18, 0.9765), (19, 0.9764), (20, 0.9757)]

'accuracy85': [(0, 0.0979), (1, 0.2902), (2, 0.7042), (3, 0.8637), (4, 0.9031), (5, 0.9292), (6, 0.9399), (7, 0.9434), (8, 0.9506), (9, 0.9603), (10, 0.9604), (11, 0.9552), (12, 0.9608), (13, 0.9672), (14, 0.9663), (15, 0.9619), (16, 0.9672), (17, 0.9704), (18, 0.9693), (19, 0.9713), (20, 0.9685)]

'accuracy89': [(0, 0.1062), (1, 0.1567), (2, 0.1843), (3, 0.265), (4, 0.4011), (5, 0.4869), (6, 0.4514), (7, 0.6045), (8, 0.6701), (9, 0.7649), (10, 0.8323), (11, 0.7707), (12, 0.8083), (13, 0.8634), (14, 0.8293), (15, 0.8146), (16, 0.8179), (17, 0.9034), (18, 0.8833), (19, 0.9085), (20, 0.907)]

'accuracy90': [(0, 0.1032), (1, 0.1722), (2, 0.1028), (3, 0.1014), (4, 0.1179), (5, 0.1409), (6, 0.1135), (7, 0.1032), (8, 0.1028), (9, 0.0958), (10, 0.1028), (11, 0.1032), (12, 0.1135), (13, 0.1028), (14, 0.098), (15, 0.1063), (16, 0.1039), (17, 0.1056), (18, 0.1943), (19, 0.101), (20, 0.1034)]

'accuracy91': [(0, 0.1006), (1, 0.1191), (2, 0.1028), (3, 0.1135), (4, 0.1135), (5, 0.1028), (6, 0.101), (7, 0.1028), (8, 0.0892), (9, 0.0958), (10, 0.1028), (11, 0.098), (12, 0.0958), (13, 0.098), (14, 0.101), (15, 0.0892), (16, 0.1009), (17, 0.0974), (18, 0.1028), (19, 0.0982), (20, 0.101)]

1. **Dữ liệu chia theo Alpha**

Xét các trường hợp Alpha = 0.05, 0.1, 0.15, 0.2, 1 với

Alpha = 0.05 ~ 90% non-iid

= 0.1 ~ 80%

= 0.15 ~ 73%

= 0.2 ~ 68%

= 1 ~ 45%

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Alpha | 0.05 | 0.1 | 0.15 | 0.2 | 1 |
| Acc | 0.9268 | 0.9773 | 0.9846 | 0.9819 | 0.9895 |

'accuracy0.05': [(0, 0.0773), (1, 0.1135), (2, 0.1253), (3, 0.4484), (4, 0.5361), (5, 0.378), (6, 0.5775), (7, 0.5608), (8, 0.5296), (9, 0.6439), (10, 0.5836), (11, 0.5936), (12, 0.6299), (13, 0.6971), (14, 0.7238), (15, 0.7634), (16, 0.6985), (17, 0.6401), (18, 0.6566), (19, 0.6536), (20, 0.7017), (21, 0.7343), (22, 0.7417), (23, 0.7749), (24, 0.7366), (25, 0.7608), (26, 0.788), (27, 0.9065), (28, 0.9168), (29, 0.8434), (30, 0.7959), (31, 0.8393), (32, 0.8194), (33, 0.8346), (34, 0.8745), (35, 0.8462), (36, 0.8458), (37, 0.7369), (38, 0.8426), (39, 0.8581), (40, 0.8864), (41, 0.9255), (42, 0.8907), (43, 0.9025), (44, 0.9268), (45, 0.9098), (46, 0.8893), (47, 0.8676), (48, 0.8883), (49, 0.8751), (50, 0.8899)]

'accuracy0.1': [(0, 0.0958), (1, 0.2114), (2, 0.2622), (3, 0.4902), (4, 0.5286), (5, 0.8017), (6, 0.7664), (7, 0.7857), (8, 0.8202), (9, 0.7355), (10, 0.8339), (11, 0.8778), (12, 0.9057), (13, 0.8241), (14, 0.8566), (15, 0.8474), (16, 0.9243), (17, 0.9545), (18, 0.9219), (19, 0.9202), (20, 0.9335), (21, 0.8767), (22, 0.8514), (23, 0.8786), (24, 0.9061), (25, 0.9475), (26, 0.9548), (27, 0.9584), (28, 0.9671), (29, 0.9468), (30, 0.9498), (31, 0.9024), (32, 0.9249), (33, 0.9508), (34, 0.9541), (35, 0.9648), (36, 0.9278), (37, 0.9394), (38, 0.9613), (39, 0.9229), (40, 0.9359), (41, 0.9305), (42, 0.9482), (43, 0.9159), (44, 0.9364), (45, 0.9773), (46, 0.9468), (47, 0.9707), (48, 0.9714), (49, 0.8787), (50, 0.9117)]

'accuracy0.15': [(0, 0.0555), (1, 0.2803), (2, 0.6514), (3, 0.771), (4, 0.6838), (5, 0.78), (6, 0.8525), (7, 0.8729), (8, 0.8901), (9, 0.888), (10, 0.8983), (11, 0.8942), (12, 0.9074), (13, 0.935), (14, 0.9537), (15, 0.9625), (16, 0.933), (17, 0.9637), (18, 0.9629), (19, 0.9642), (20, 0.9605), (21, 0.9359), (22, 0.9336), (23, 0.9561), (24, 0.9523), (25, 0.9575), (26, 0.9746), (27, 0.9717), (28, 0.9831), (29, 0.9832), (30, 0.9786), (31, 0.9606), (32, 0.9781), (33, 0.9782), (34, 0.9819), (35, 0.9733), (36, 0.9772), (37, 0.9749), (38, 0.9828), (39, 0.9779), (40, 0.9846), (41, 0.9705), (42, 0.9772), (43, 0.947), (44, 0.9742), (45, 0.9763), (46, 0.977), (47, 0.9694), (48, 0.9769), (49, 0.9844), (50, 0.9806)]

'accuracy0.2': [(0, 0.0892), (1, 0.4642), (2, 0.5875), (3, 0.7965), (4, 0.8381), (5, 0.8348), (6, 0.8698), (7, 0.9013), (8, 0.9389), (9, 0.9583), (10, 0.8393), (11, 0.9117), (12, 0.9635), (13, 0.9564), (14, 0.9577), (15, 0.9544), (16, 0.966), (17, 0.9133), (18, 0.9491), (19, 0.9492), (20, 0.9254), (21, 0.9605), (22, 0.9723), (23, 0.9686), (24, 0.9656), (25, 0.9765), (26, 0.9819), (27, 0.9659), (28, 0.9715), (29, 0.9711), (30, 0.977), (31, 0.9701), (32, 0.9735), (33, 0.9544), (34, 0.9762), (35, 0.9714), (36, 0.963), (37, 0.9617), (38, 0.9735), (39, 0.9761), (40, 0.9646), (41, 0.9493), (42, 0.9643), (43, 0.9628), (44, 0.9743), (45, 0.9586), (46, 0.9645), (47, 0.9619), (48, 0.9797), (49, 0.9613), (50, 0.9799)]

'accuracy1': [(0, 0.1007), (1, 0.6903), (2, 0.9478), (3, 0.9586), (4, 0.9569), (5, 0.9667), (6, 0.9445), (7, 0.9368), (8, 0.9705), (9, 0.9632), (10, 0.9461), (11, 0.9786), (12, 0.9754), (13, 0.9822), (14, 0.9844), (15, 0.9865), (16, 0.977), (17, 0.9841), (18, 0.9813), (19, 0.9872), (20, 0.9835), (21, 0.9864), (22, 0.9846), (23, 0.9853), (24, 0.9874), (25, 0.9792), (26, 0.9687), (27, 0.9777), (28, 0.986), (29, 0.9877), (30, 0.9874), (31, 0.9796), (32, 0.9819), (33, 0.9878), (34, 0.9874), (35, 0.9887), (36, 0.984), (37, 0.9857), (38, 0.9832), (39, 0.9825), (40, 0.9871), (41, 0.9822), (42, 0.9877), (43, 0.9811), (44, 0.9877), (45, 0.9891), (46, 0.9759), (47, 0.9888), (48, 0.9844), (49, 0.9895), (50, 0.982)]

1. **Test 200 round**

Alpha = 1

FINAL RESULTS:

Test: commun\_round: 200 | global\_acc: 0.9916 | global\_pre: 0.9916181753588864 | global\_rec: 0.9916 | global\_f1s: 0.9916018705526174

{'accuracy': [(0, 0.0898), (1, 0.7381), (2, 0.8275), (3, 0.9155), (4, 0.9616), (5, 0.9349), (6, 0.9774), (7, 0.9741), (8, 0.9811), (9, 0.9778), (10, 0.9788), (11, 0.9808), (12, 0.9776), (13, 0.9801), (14, 0.9791), (15, 0.982), (16, 0.9818), (17, 0.9781), (18, 0.9776), (19, 0.986), (20, 0.9821), (21, 0.98), (22, 0.982), (23, 0.984), (24, 0.9882), (25, 0.9857), (26, 0.9836), (27, 0.9833), (28, 0.9829), (29, 0.9828), (30, 0.9838), (31, 0.9818), (32, 0.9808), (33, 0.985), (34, 0.9876), (35, 0.985), (36, 0.9881), (37, 0.9877), (38, 0.9878), (39, 0.9883), (40, 0.9843), (41, 0.9886), (42, 0.9858), (43, 0.9871), (44, 0.9878), (45, 0.9894), (46, 0.9869), (47, 0.9899), (48, 0.9883), (49, 0.9892), (50, 0.9897), (51, 0.9867), (52, 0.987), (53, 0.9888), (54, 0.9848), (55, 0.9867), (56, 0.9885), (57, 0.9872), (58, 0.9899), (59, 0.9886), (60, 0.9889), (61, 0.9873), (62, 0.988), (63, 0.9896), (64, 0.9868), (65, 0.9881), (66, 0.9889), (67, 0.9898), (68, 0.9872), (69, 0.9889), (70, 0.9889), (71, 0.9892), (72, 0.9894), (73, 0.9881), (74, 0.9866), (75, 0.9902), (76, 0.9896), (77, 0.9852), (78, 0.9886), (79, 0.9897), (80, 0.9887), (81, 0.9888), (82, 0.9902), (83, 0.9899), (84, 0.9856), (85, 0.9893), (86, 0.989), (87, 0.9885), (88, 0.9899), (89, 0.9885), (90, 0.9903), (91, 0.9897), (92, 0.9892), (93, 0.9885), (94, 0.9887), (95, 0.9887), (96, 0.9899), (97, 0.9891), (98, 0.9905), (99, 0.9889), (100, 0.9907), (101, 0.9869), (102, 0.988), (103, 0.9908), (104, 0.9905), (105, 0.9902), (106, 0.9888), (107, 0.9899), (108, 0.9912), (109, 0.9907), (110, 0.9906), (111, 0.9901), (112, 0.9904), (113, 0.9893), (114, 0.9905), (115, 0.9898), (116, 0.99), (117, 0.9898), (118, 0.9909), (119, 0.9909), (120, 0.9894), (121, 0.9899), (122, 0.9897), (123, 0.9908), (124, 0.99), (125, 0.9906), (126, 0.9906), (127, 0.99), (128, 0.9911), (129, 0.9911), (130, 0.9904), (131, 0.9911), (132, 0.9911), (133, 0.9901), (134, 0.9906), (135, 0.9905), (136, 0.991), (137, 0.991), (138, 0.9907), (139, 0.9906), (140, 0.9908), (141, 0.9916), (142, 0.9912), (143, 0.9911), (144, 0.9908), (145, 0.9905), (146, 0.9897), (147, 0.9897), (148, 0.9897), (149, 0.9898), (150, 0.9904), (151, 0.9903), (152, 0.9901), (153, 0.9904), (154, 0.991), (155, 0.99), (156, 0.9908), (157, 0.9906), (158, 0.9897), (159, 0.9893), (160, 0.9885), (161, 0.9899), (162, 0.9899), (163, 0.9903), (164, 0.9903), (165, 0.99), (166, 0.9909), (167, 0.9898), (168, 0.9905), (169, 0.9903), (170, 0.9901), (171, 0.9899), (172, 0.9901), (173, 0.9905), (174, 0.9893), (175, 0.9904), (176, 0.9902), (177, 0.9903), (178, 0.9904), (179, 0.991), (180, 0.9904), (181, 0.9905), (182, 0.9906), (183, 0.9905), (184, 0.9905), (185, 0.9908), (186, 0.9909), (187, 0.9909), (188, 0.991), (189, 0.9906), (190, 0.9909), (191, 0.9902), (192, 0.9908), (193, 0.9906), (194, 0.9909), (195, 0.9906), (196, 0.9908), (197, 0.9889), (198, 0.9905), (199, 0.9905), (200, 0.9906)],

Alpha = 1000