Deep Learning-based Patient Re-identification Is able to Exploit the Biometric Nature of Medical Chest X-ray Data

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Supplementary Material

Supplementary Table 1. Additional patient verification results: Comparison of different data handling techniques (FTS and RNP), training set sizes N_s and learning rates η. We present the AUC (together with the lower and upper bounds of the 95 % confidence intervals from 10,000 bootstrap runs), the accuracy, the specificity, the recall, the precision, and the F1-score.

Data handling	N_s	η	AUC + 95 % CI	Accuracy ($\frac{TP+TN}{P+N}$)	Specificity ($\frac{TN}{N}$)	Recall ($\frac{TP}{P}$)	Precision ($\frac{TP}{TP+FP}$)	F1-score
FTS	100,000	10^{-4}	$0.8509\ ^{0.8532}_{0.8485}$	$0.7461\ (\frac{74,605}{100,000})$	$0.8414\ (\frac{42,071}{50,000})$	$0.6507\ (\frac{32,534}{50,000})$	$0.8040\ (\frac{32,534}{40,463})$	0.7193
		10^{-5}	$0.7429\ ^{0.7459}_{0.7399}$	$0.6322\ (\frac{63,223}{100,000})$	$0.7924\ (\frac{39,619}{50,000})$	$0.4721\ (\frac{23,604}{50,000})$	$0.6945\ (\frac{23,604}{33,985})$	0.5621
		10^{-6}	$0.7257\ ^{0.7289}_{0.7225}$	$0.6702\ (\frac{67,020}{100,000})$	$0.6719\ (\frac{33,594}{50,000})$	$0.6685\ (\frac{33,426}{50,000})$	$0.6708\ (\frac{33,426}{49,832})$	0.6696
		10^{-7}	$0.7440\ ^{0.7470}_{0.7409}$	$0.6741\ (\frac{67,410}{100,000})$	$0.7002\ (\frac{35,008}{50,000})$	$0.6480\ (\frac{32,402}{50,000})$	$0.6837\ (\frac{32,402}{47,394})$	0.6654
	200,000	10^{-4}	$0.8886\ ^{0.8906}_{0.8866}$	$0.7920\ (\frac{79,203}{100,000})$	$0.8547\ (\frac{42,736}{50,000})$	$0.7293\ (\frac{36,467}{50,000})$	$0.8339\ (\frac{36,467}{43,731})$	0.7781
		10^{-5}	$0.8158\ ^{0.8185}_{0.8132}$	$0.6758\ (\frac{67,582}{100,000})$	$0.8574\ (\frac{42,869}{50,000})$	$0.4943\ (\frac{24,713}{50,000})$	$0.7761\ (\frac{24,713}{31,844})$	0.6039
		10^{-6}	$0.7615\ ^{0.7645}_{0.7586}$	$0.6755\ (\frac{67,552}{100,000})$	$0.7448\ (\frac{37,242}{50,000})$	$0.6062\ (\frac{30,310}{50,000})$	$0.7038\ (\frac{30,310}{43,068})$	0.6514
		10^{-7}	$0.7526\ ^{0.7556}_{0.7495}$	$0.6819\ (\frac{68,194}{100,000})$	$0.6791\ (\frac{33,957}{50,000})$	$0.6847\ (\frac{34,237}{50,000})$	$0.6809\ (\frac{34,237}{50,280})$	0.6828
	400,000	10^{-3}	$0.9541\ ^{0.9552}_{0.9529}$	$0.8852\ (\frac{88,519}{100,000})$	$0.8655\ (\frac{43,275}{50,000})$	$0.9049\ (\frac{45,244}{50,000})$	$0.8706\ (\frac{45,244}{51,969})$	0.8874
		10^{-5}	$0.8518\ ^{0.8542}_{0.8494}$	$0.7450\ (\frac{74,498}{100,000})$	$0.8410\ (\frac{42,050}{50,000})$	$0.6490\ (\frac{32,448}{50,000})$	$0.8032\ (\frac{32,448}{40,398})$	0.7179
		10^{-6}	$0.7417\ ^{0.7449}_{0.7386}$	$0.6572\ (\frac{65,715}{100,000})$	$0.7152\ (\frac{35,761}{50,000})$	$0.5991\ (\frac{29,954}{50,000})$	$0.6778\ (\frac{29,954}{44,193})$	0.6360
		10^{-7}	$0.7306\ ^{0.7337}_{0.7275}$	$0.6567\ (\frac{65,670}{100,000})$	$0.6801\ (\frac{34,006}{50,000})$	$0.6333\ (\frac{31,664}{50,000})$	$0.6644\ (\frac{31,664}{47,658})$	0.6485
	800,000	10^{-3}	$0.9826\ ^{0.9833}_{0.9820}$	$0.9324\ (\frac{93,238}{100,000})$	$0.9393\ (\frac{46,966}{50,000})$	$0.9254\ (\frac{46,272}{50,000})$	$0.9385\ (\frac{46,272}{49,306})$	0.9319
RNP		10^{-4}	$\mathbf{0.9940}\ ^{0.9944}_{0.9937}$	$0.9555\ (\frac{95,545}{100,000})$	$0.9822\ (\frac{49,111}{50,000})$	$0.9287\ (\frac{46,434}{50,000})$	$0.9812\ (\frac{46,434}{47,323})$	0.9542
		10^{-5}	$0.9278\ ^{0.9294}_{0.9262}$	$0.8339\ (\frac{83,392}{100,000})$	$0.8946\ (\frac{44,732}{50,000})$	$0.7732\ (\frac{38,660}{50,000})$	$0.8801\ (\frac{38,660}{43,928})$	0.8232
FTS		10^{-5}	$0.9200\ ^{0.9217}_{0.9182}$	$0.8215\ (\frac{82,153}{100,000})$	$0.8888\ (\frac{44,440}{50,000})$	$0.7543\ (\frac{37,713}{50,000})$	$0.8715\ (\frac{37,713}{43,273})$	0.8087
		10^{-6}	$0.8669\ ^{0.8692}_{0.8646}$	$0.7752\ (\frac{77,519}{100,000})$	$0.8165\ (\frac{40,823}{50,000})$	$0.7339\ (\frac{36,696}{50,000})$	$0.7999\ (\frac{36,696}{45,873})$	0.7655
		10^{-7}	$0.8126\ ^{0.8152}_{0.8099}$	$0.7247\ (\frac{72,468}{100,000})$	$0.7502\ (\frac{37,509}{50,000})$	$0.6992\ (\frac{34,959}{50,000})$	$0.7368\ (\frac{34,959}{47,450})$	0.7175