

Subject	IMU hand		IMU chest		IMU ankle	
	Count	%	Count	%	Count	%
1	1454	0.39	509	0.14	1327	0.35
2	2729	0.61	387	0.09	2445	0.55
3	522	0.21	183	0.07	527	0.21
4	2214	0.67	213	0.06	1101	0.33
5	1541	0.41	312	0.08	1980	0.53
6	1021	0.28	343	0.09	1372	0.38
7	1506	0.48	257	0.08	1037	0.33
8	2151	0.53	1308	0.32	1951	0.48

Table 1. The count and percentage of missing values in PAMAP2.

Raw Bias (RBias), has a similar form Mean Absolute Error (MAE):

$$\text{RBias} = \frac{1}{n} \sum_{i=1}^n |\hat{Q} - Q| \quad (1)$$

Percent Bias (PBias):

$$\text{PBias} = \frac{1}{n} \sum_{i=1}^n |(\hat{Q} - Q)/Q| \times 100 \quad (2)$$

Root Mean Square Error (RMSE)

$$\text{RMSE} = \sqrt{\frac{1}{n} \sum_{i=1}^n (\hat{Q} - Q)^2} \quad (3)$$

where Q is missing values, \hat{Q} is the corresponding predicted values, and n is the count of missing values.

$$X_e[k] = \sum_{n=0}^{N-1} X_e[n] e^{-j \frac{2\pi k n}{N}}, \quad S_e[k] = |X_e[k]|^2. \quad (4)$$

$$\bar{E} = \frac{\sum_{k=0}^{N-1} S_e[k]}{N}, \quad \text{SNR} = \frac{S_e[\frac{N}{3}]}{\bar{E}}. \quad (5)$$

Subject	Mean ¹		Sample ²		LOCF ³		Linear ⁴		PMM ⁵	
	MAE	RMSE	MAE	RMSE	MAE	RMSE	MAE	RMSE	MAE	RMSE
1	7.949	15.723	11.163	22.291	0.431	1.737	0.264	1.206	6.231	13.144
2	5.238	9.932	7.422	14.038	0.338	1.315	0.207	0.97	4.171	8.593
3	4.757	8.909	6.709	12.623	0.289	0.991	0.179	0.668	3.605	7.537
4	5.367	10.467	7.633	14.759	0.299	0.856	0.191	0.567	4.192	8.720
5	5.457	10.692	7.783	15.119	0.387	1.471	0.235	1.047	4.637	9.510
6	5.438	10.286	7.683	14.503	0.432	1.923	0.259	1.416	4.555	9.121
7	5.396	10.391	7.657	14.735	0.372	1.764	0.242	1.339	3.919	8.256
8	5.315	10.091	7.537	14.288	0.377	1.741	0.233	1.256	4.094	8.223

Table 2. Evaluation of different imputation methods on PAMAP2 dataset. ¹Unconditional mean imputation; ²Random sample from observed values; ³Last observation carried forward; ⁴Linear Interpolation; ⁵Predictive mean matching

Subject	Cubic Spline		Elastic Net	
	MAE	RMSE	MSE	RMSE
1	0.217	0.461	10.584	13.510
2	0.472	1.053	9.370	13.467
3	0.138	0.364	9.303	12.417
4	0.181	0.608	10.308	13.651
5	0.262	0.542	9.642	13.000
6	0.300	0.782	13.592	18.123
7	0.183	0.437	10.568	14.038
8	1.426	2.250	15.755	21.255

Table 3. Performance of heart rate imputation using cubic spline interpolation and elastic net. The performance of elastic net is obtained by averaging the results of 10-fold cross validation. The parameters have been fine-tuned in each validation.