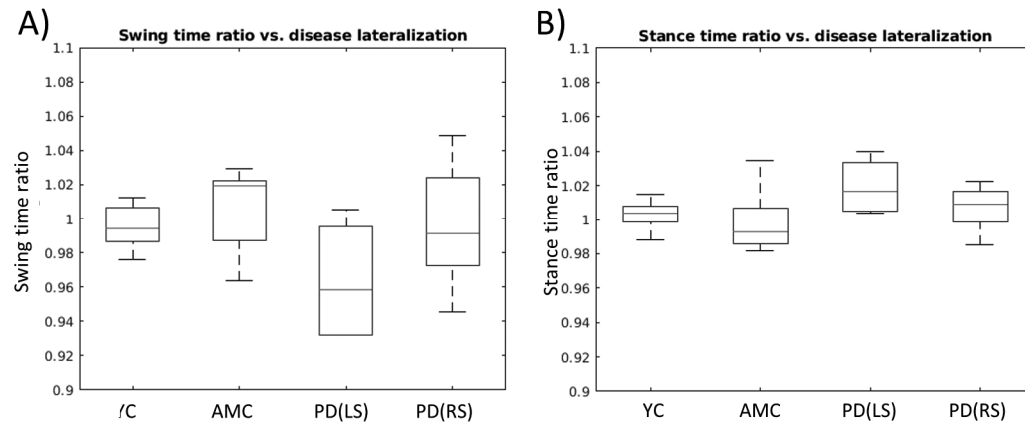**Supplementary Table S1.** Overall accuracy (ACC), sensitivity (SEN) and specificity (SPE) in gait detection of the predictive models with different predictors' datasets while validated in a leave-one out scheme. Characteristics of the classifiers: Coarse tree- Split Criterion = 'gdi', MaxNumSplits = 4; Linear SVM- Kernel function = Linear, Kernel scale = automatic, Box constraint level = 1, Multiclass method = one-vs-one, Standardize data = true; Quadratic SVM- Kernel function = Quadratic, Kernel scale = automatic, Box constraint level = 1, Multiclass method = one-vs-one, Standardize data = true; Cubic SVM- Kernel function = Cubic, Kernel scale = automatic, Box constraint level = 1, Multiclass method = one-vs-one, Standardize data = true; Fine KNN- Number of neighbors = 1, Distance metric = Euclidean, Distance weight = true ; Medium KNN- Number of neighbors = 10, Distance metric = Euclidean, Distance weight = true; Cubic KNN- Number of neighbors = 10, Distance metric = Minkowski, Distance weight = true; Cosine KNN- Number of neighbors = 10, Distance metric = Cosine, Distance weight = true; Linear Discriminant: Covariance structure: full; A 39-fold (i.e., leave-one out) cross validation scheme was employed for all the analyses.

Predictive model		Kinematics	Kinetics	Kinematics + Kinetics	All parameters
Coarse Tree	ACC	46.2	25.6	48.7	43.6
	SEN	36.4	30.8	44.4	37.5
	SPE	50.0	23.1	50.0	45.2
Linear SVM	ACC	61.6	38.5	51.3	53.9
	SEN	50.0	30.0	33.3	36.4
	SPE	65.6	41.4	59.3	60.7
Quadratic SVM	ACC	48.7	28.2	53.9	48.7
	SEN	31.2	26.7	36.4	25.0
	SPE	60.9	29.2	60.7	59.3
Cubic SVM	ACC	53.9	30.8	48.7	48.7
	SEN	36.4	25.0	30.8	30.8
	SPE	60.7	33.3	57.7	57.7
Fine KNN	ACC	43.6	35.9	38.5	43.6
	SEN	23.1	35.7	30.0	27.3
	SPE	53.9	36.0	41.4	50.0
Medium KNN	ACC	53.9	56.4	51.3	51.3
	SEN	50.0	37.5	36.4	33.3
	SPE	56.5	61.3	57.1	62.5
Cubic KNN	ACC	53.9	56.4	51.3	43.6
	SEN	43.8	45.5	28.6	18.2
	SPE	60.9	60.7	56.3	53.6
Cosine KNN	ACC	51.3	51.3	51.3	59.0
	SEN	37.5	55.6	42.9	45.5
	SPE	54.8	50.0	53.1	64.3
Linear Discriminant	ACC	43.6	41.0	43.6	64.1
	SEN	35.7	30.8	38.5	47.1
	SPE	48.0	46.2	46.2	77.3

Supplementary Figure S1. Boxplots of the (**A**) swing time ratio and (**B**) stance time ratio (normalized to the right foot) across stepping movements and groups while considering disease lateralization in PD patients. Abbreviations: RS = right side. LS = left side.