

# Multivariate two-sample hypothesis testing through AUC maximization for biomedical applications - Supplementary Material

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## ABSTRACT

This is a document containing material that constitutes the Supplementary Material for the paper entitled as shown above, which has been published in the 11th EETN Conference on Artificial Intelligence (SETN 2020). The included supplementary material consists of: i) Wall-clock information about the proposed algorithm and ii) Dataset characteristics and features' description.

## SUPPLEMENTARY MATERIAL

### A. Computational cost of the ts-AUC test

In order to find the empirical AUC\* one needs to tune the hyper-parameters the leaf-size  $LS$  and the number of features per tree  $M$ . The wall-clock time we measured for each iteration of the proposed ts-AUC test, taking into account the experimental setting and the number of DTs ( $N = 50$ ), was  $\approx 0.12\text{sec}$  to  $0.13\text{sec}$  (Intel® Xeon® Processor E3-1505M v6).

### B. Dataset characteristics

Here we provide details about the datasets we used and the included patient's features.

Table 1: Characteristics of the 123 patients of our dataset.

Characteristics	Non-Fallers	Fallers
Population	99	24
Age	$78.8 \pm 5.3$	$78.5 \pm 5.9$
Gender	M:71/W:28	M:16/W:8
UPDRS III total score	$23.6 \pm 11.9$	$26.3 \pm 11.1$
Disease duration	$4.7 \pm 3.5$	$5.7 \pm 4.2$

Table 2: Computed features derived from the CoP displacement during the acquisitions.

Feature Characteristics	Unit	Description
RangeX	cm	–
MaxX	cm	Maximum medio-lateral displacement (right)
MinX	cm	Minimum medio-lateral displacement (left)
VarianceX	cm <sup>2</sup>	–
VelocityX	cm/s	Average instant x-axis velocity of CoP changes
AccelerationX	cm/s <sup>2</sup>	Average instant x-axis acceleration of CoP changes
F95X	Hz	Frequency below which 95% of the x-axis CoP trajectory's energy lies
RangeY	cm	–
MaxY	cm	Maximum antero-posterior displacement (front)
MinY	cm	Minimum antero-posterior displacement (back)
VarianceY	cm <sup>2</sup>	–
VelocityY	cm/s	Average instant y-axis velocity of CoP changes
AccelerationY	cm/s <sup>2</sup>	Average instant y-axis acceleration of CoP changes
F95Y	Hz	Frequency below which 95% of the y-axis CoP trajectory's energy lies
DistC	cm	Instant distance from the center of the trajectory
EllArea	cm <sup>2</sup>	Confidence ellipse area that covers the 95% of the trajectory's points
AngularDeviation	degrees	Average of the angle of deviation

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