



Stato avanzamento progetti:

- Misure in telemedicina
- Sensori inerziali



1506
UNIVERSITÀ
DEGLI STUDI
DI URBINO
CARLO BO



Ricercatori UniUrb affiliati allo Spoke#4
c/o Università G. d'Annunzio (Chieti-Pescara)

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Vincenzo Fano, Valerio Freschi, Riccardo Izzo,
Emanuele Lattanzi, Francesco Lucertini, Matteo
Montani, Fabrizio Perroni*





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One-Health: telemedicine and environment

WP3 – Telemedicina e salute ambientale



- Task 3.1: Costruzione di Database e protezione dei dati
- Task 3.2: Network di Telemedicina e classificazione dei pazienti
- Task 3.3: Tecniche avanzate di realtà aumentata



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Sensor-based Human Activity Recognition



3-Axis Accelerometer

ActiGraph



Multi-Wavelength Photoplethysmography PPG



Gyroscope



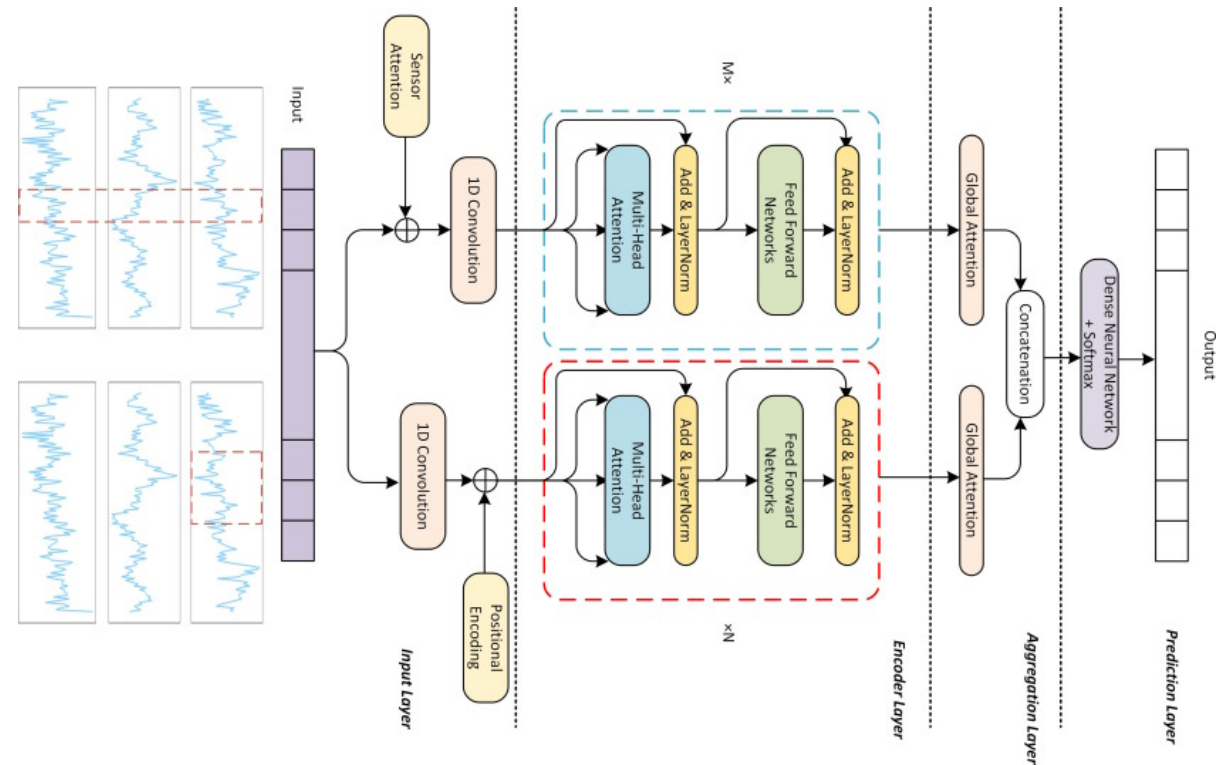
Skin Temperature Sensor



Barometer

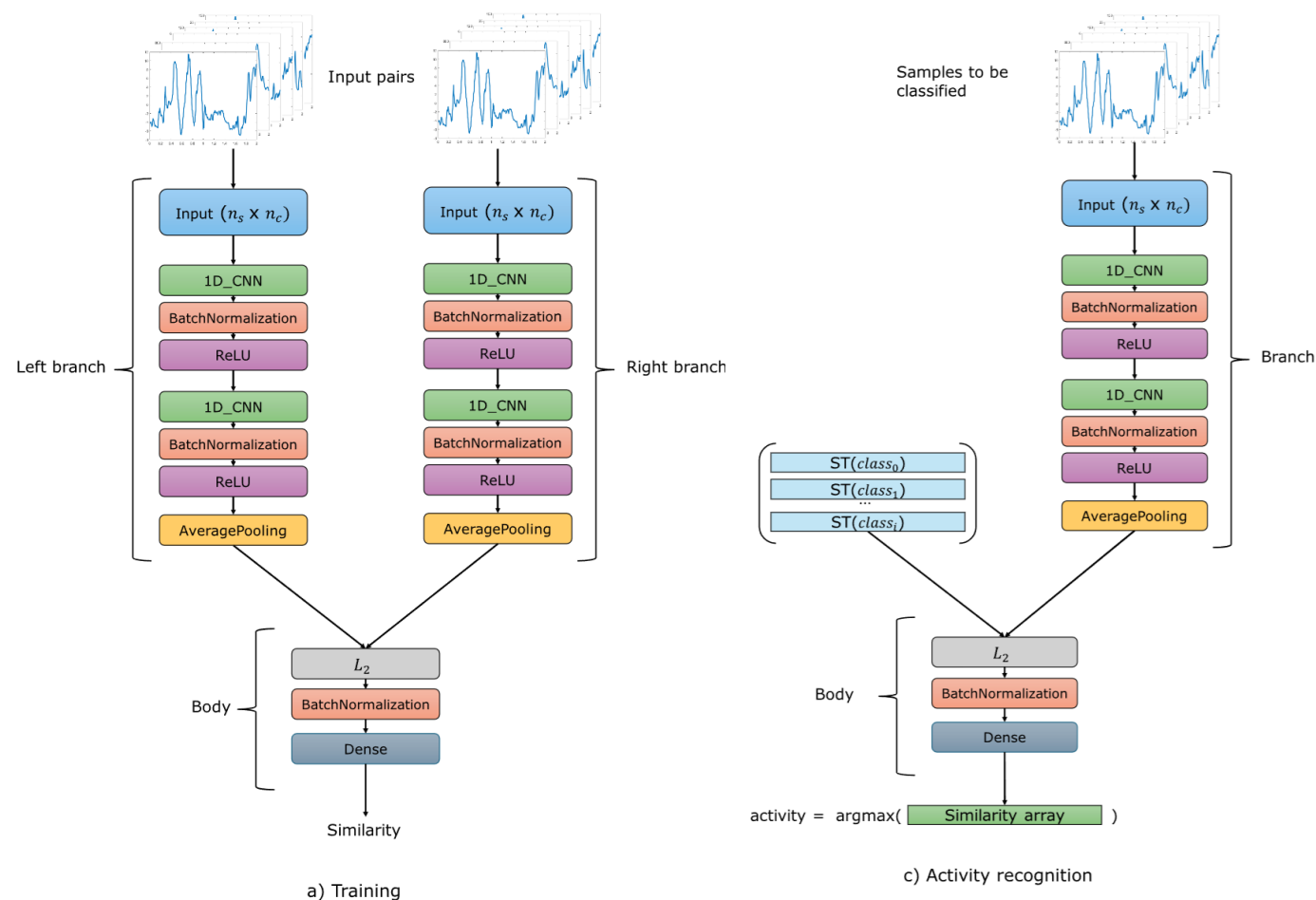


Microphone





Semantic Template Recognition



True label \ Predicted label	1	2	3	4	5	6	7	8
1	0.85	0.11	0.03	0.00	0.00	0.00	0.01	0.00
2	0.21	0.47	0.30	0.00	0.00	0.01	0.01	0.00
3	0.08	0.06	0.85	0.00	0.00	0.00	0.01	0.00
4	0.00	0.00	0.03	0.95	0.00	0.00	0.01	0.00
5	0.00	0.00	0.02	0.00	0.46	0.01	0.32	0.18
6	0.02	0.00	0.13	0.00	0.00	0.83	0.02	0.00
7	0.01	0.00	0.02	0.00	0.18	0.00	0.66	0.11
8	0.02	0.01	0.03	0.00	0.42	0.00	0.16	0.36

(a) *RealWorld*, 1: Standing, 2: Laying, 3: Sitting, 4: Walking, 5: Climbing Up, 6: Climbing Down, 7: Walking, 8: Running. (Unseen classes: 2,5,7).

True label \ Predicted label	1	2	3	4	5	6
1	0.86	0.00	0.12	0.00	0.00	0.02
2	0.00	0.85	0.15	0.00	0.00	0.00
3	0.08	0.34	0.57	0.00	0.00	0.00
4	0.00	0.00	0.00	0.57	0.35	0.08
5	0.01	0.00	0.00	0.30	0.52	0.16
6	0.01	0.00	0.00	0.02	0.12	0.85

(b) *UCI-HAR*, 1: Walking, 2: Walking Upstairs, 3: Walking Downstairs, 4: Sitting, 5: Standing, 6: Laying. (Unseen classes: 1,3,5).



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Semantic Template Recognition

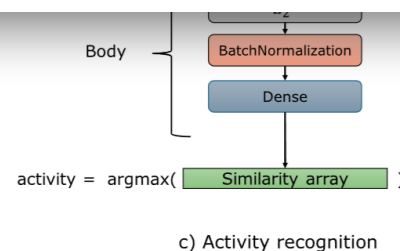
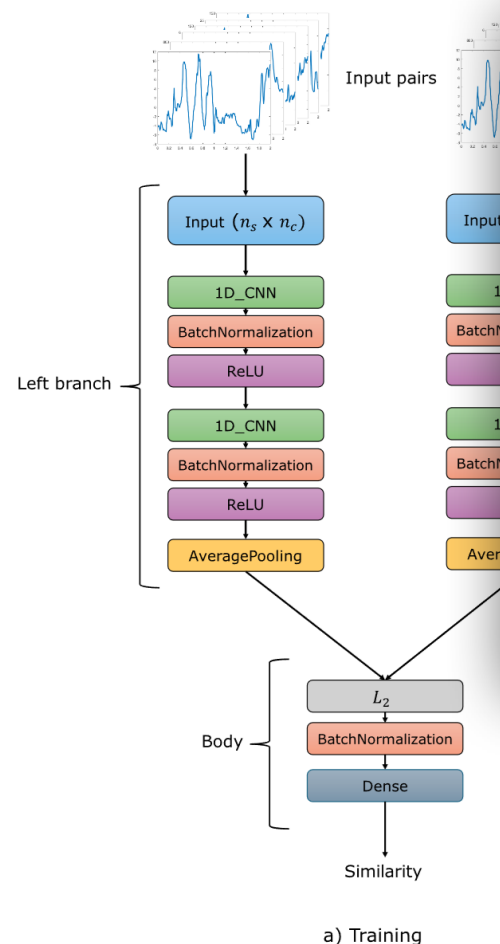
Semantic Template Recognition of Human Activities in Wearable Sensor Data Using Siamese Network

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This work was supported in part by the European Union-NextGenerationEU through the Italian Ministry of University and Research (MUR) National Innovation Ecosystem under Grant ECS00000041-VITALITY-CUP H33C22000430006.



ing, 5: Climbing Up, 6: Climbing Down, 7: Walking, seen classes: 1,3,5).
8: Running. (Unseen classes: 2,5,7).

2	0.00	0.00	0.02
5	0.00	0.00	0.00
7	0.00	0.00	0.00
0	0.57	0.35	0.08
0	0.30	0.52	0.16
0	0.02	0.12	0.85

ected label

2: Walking Upstairs, 3: Walk-
5: Standing, 6: Laying. (Un-



Self-Supervised Learning

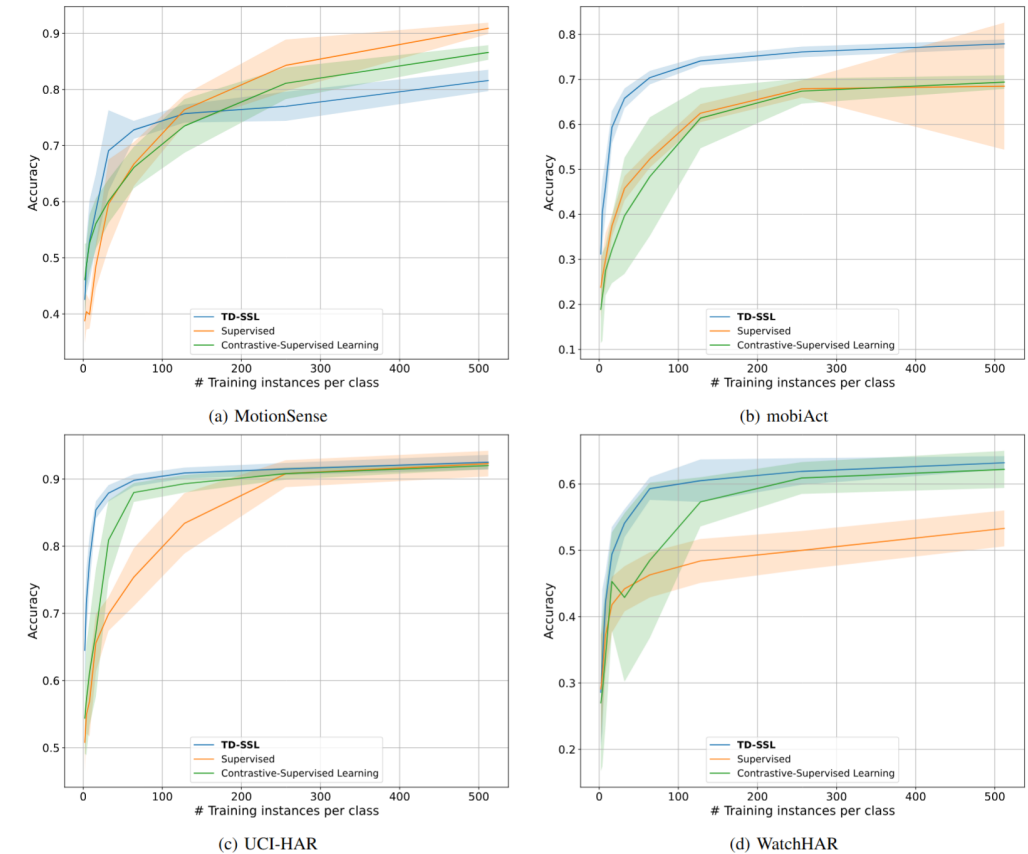
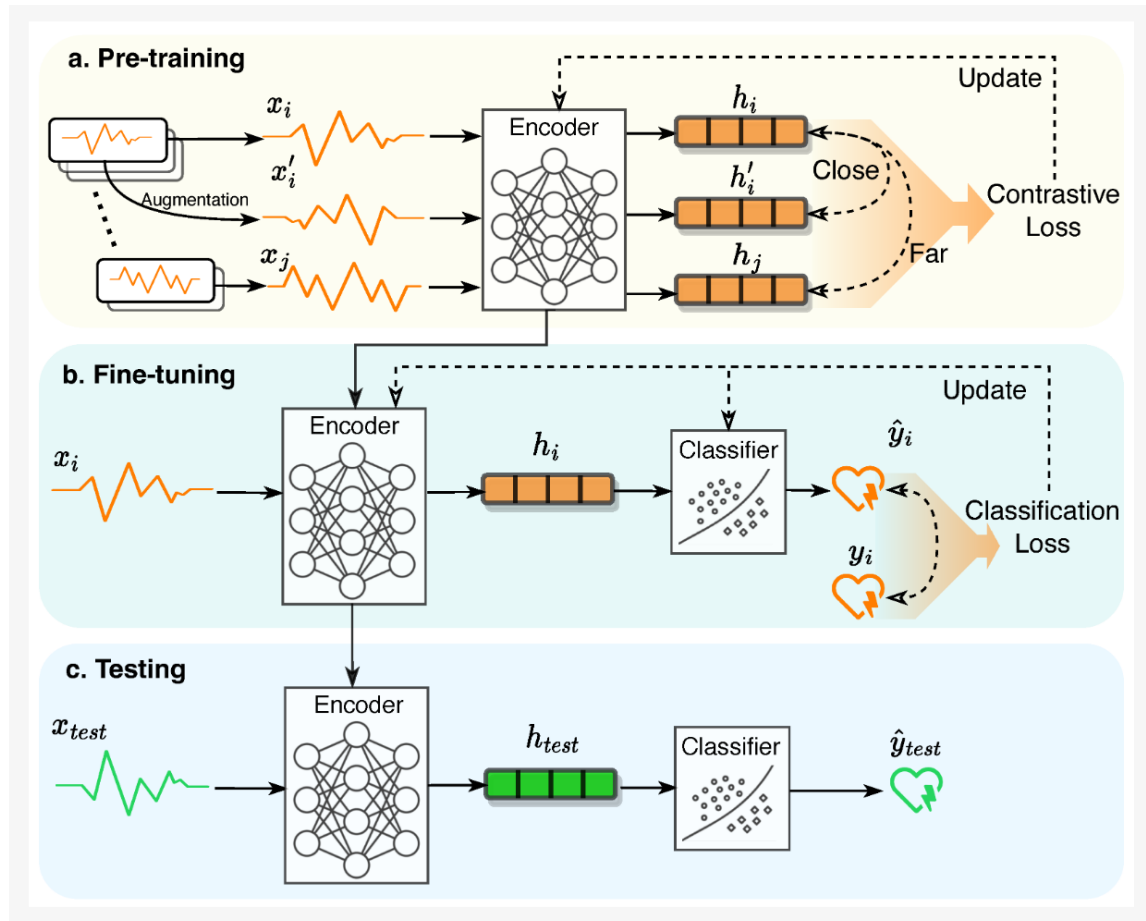


Fig. 6: Accuracy achieved as a function of the number of windows per activity, compared with TD-SSL, Supervised and Contrastive-Supervised Learning approach (CSL).



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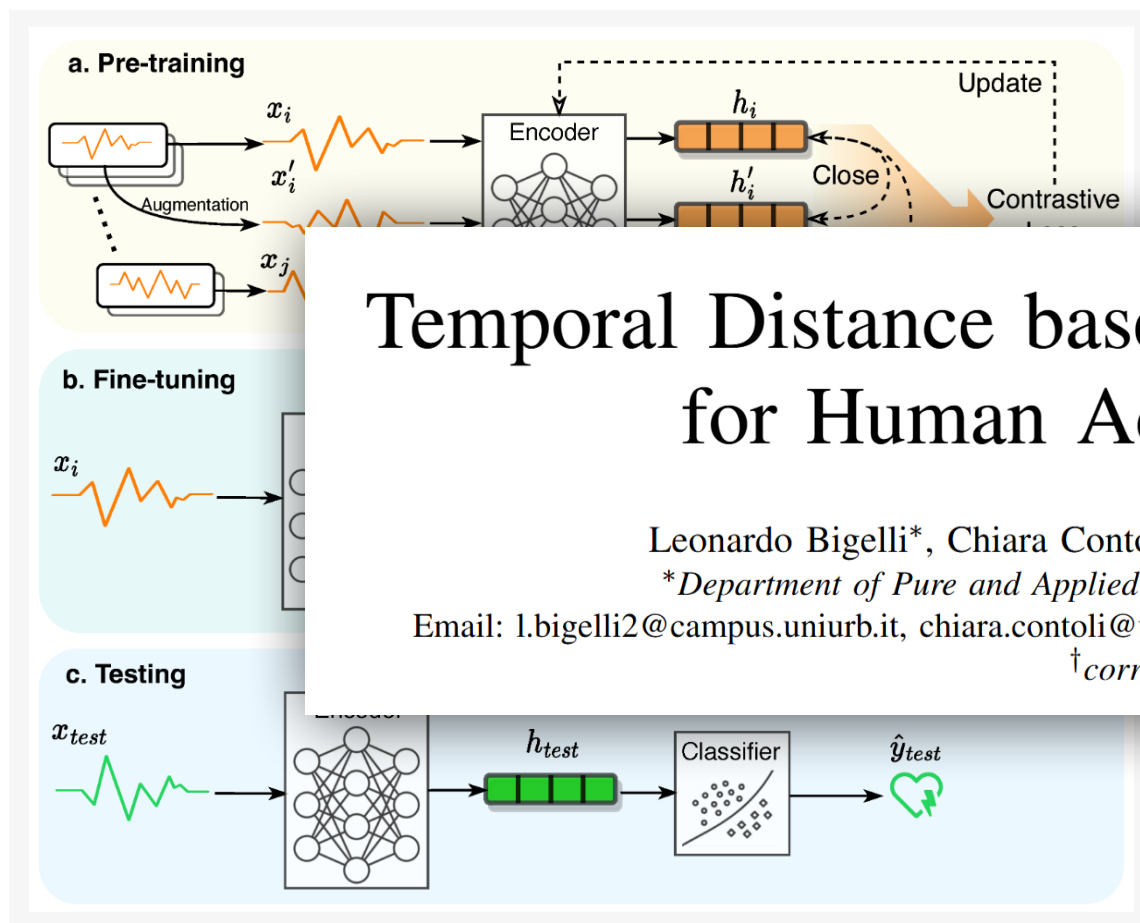


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Self-Supervised Learning



Temporal Distance based Self-Supervised Learning for Human Activity Recognition

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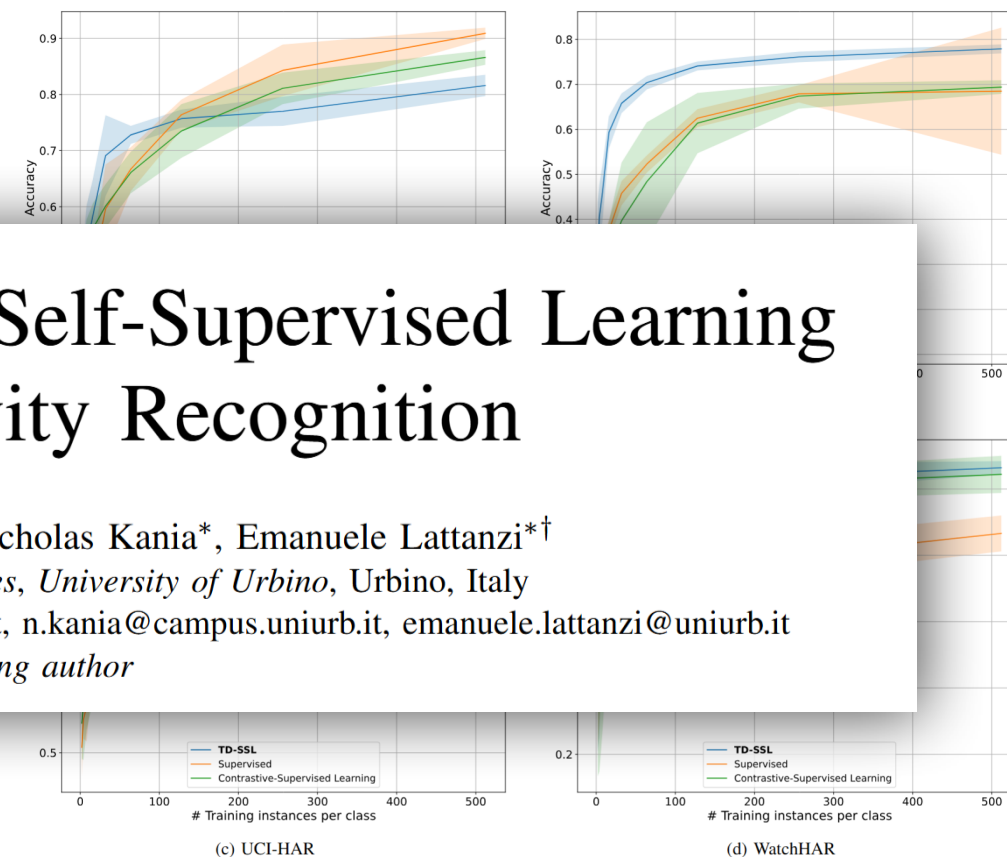
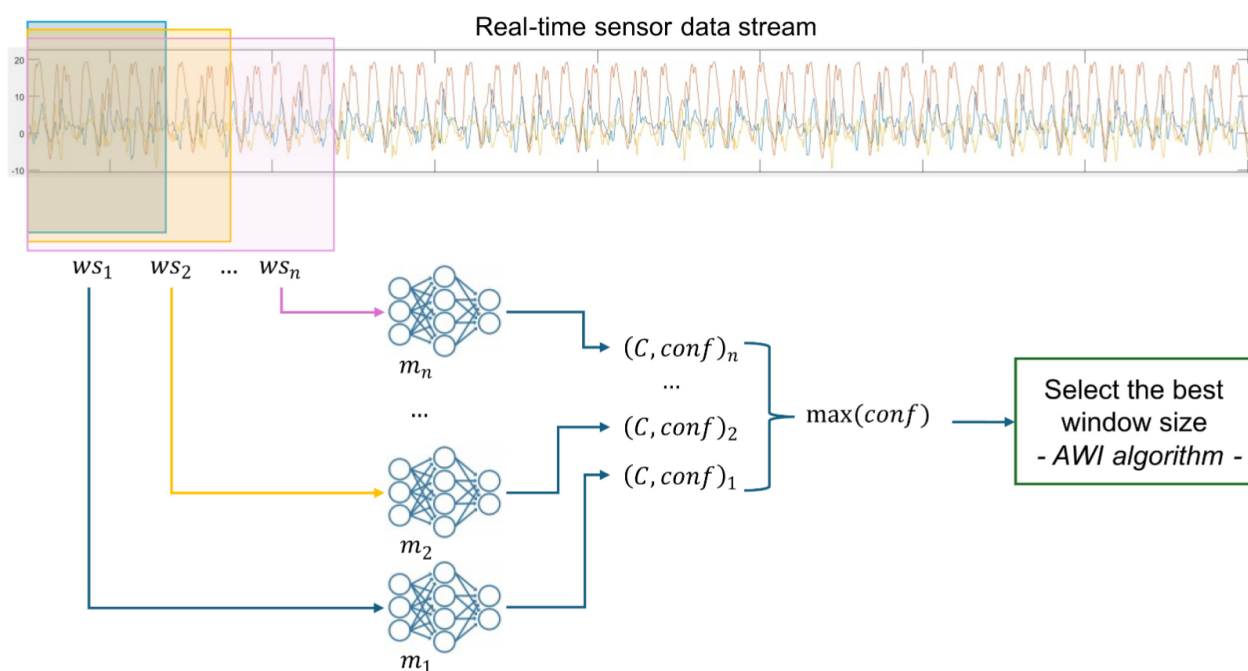


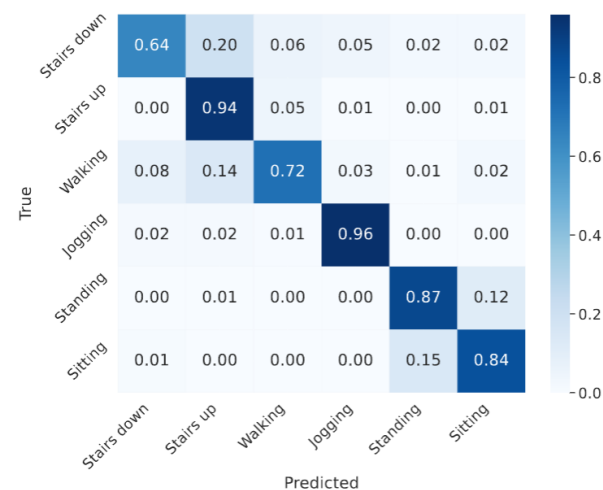
Fig. 6: Accuracy achieved as a function of the number of windows per activity, compared with TD-SSL, Supervised and Contrastive-Supervised Learning approach (CSL).



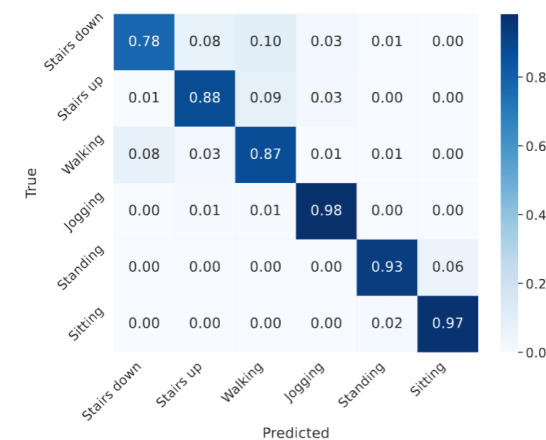
Dynamic window sizing



No dynamic sizing



dynamic sizing



(b) $\alpha = 1$

FIGURE 3: Confusion matrices for the C_{age} clustering rule in MotionSense dataset before (a) and after (b) the integration of our proposed methodology.



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Dynamic window sizing

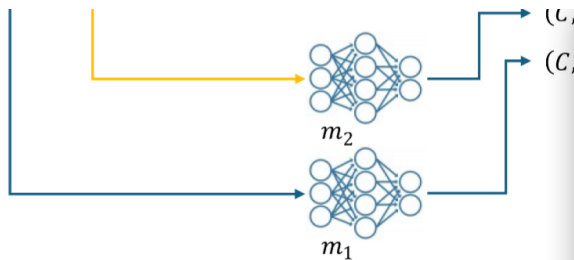
Inference-Driven Window Sizing for Enhanced Human Activity Recognition in IoT Devices

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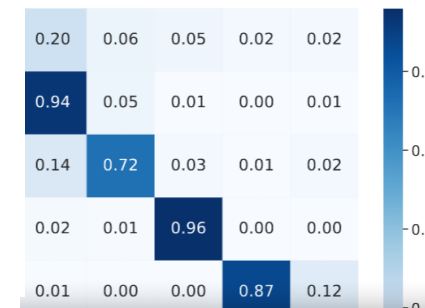
Are Transformers a Useful Tool for Tiny devices in Human Activity Recognition?

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dynamic sizing



dynamic sizing



(b) $\alpha = 1$

in matrices for the C_{age} clustering rule in before (a) and after (b) the integration methodology.