1A. Declaration of Original Work.

By entering our Student ID below, we certify that we completed our assignment independently of all others (except where sanctioned during in-class sessions), obeying the class policy outlined in the introductory lecture. In particular, we are allowed to discuss the problems and solutions in this assignment, but have waited at least 30 minutes by doing other activities unrelated to class before attempting to complete or modify our answers as per the class policy.

Signed, A0182488N, A0206420X, A0190203W, A0180913H, A0184679H

2. References.

We give credit where credit is due. We acknowledge that we used the following websites or contacts to complete this assignment:

[1] Anguita, D.; Ghio, A.; Oneto, L.; Parra, X.; Reyes-Ortiz, J.L. A Public Domain Dataset for Human Activity Recognition using Smartphones. In Proceedings of the ESANN, Bruges, Belgium, 24–26 April 2013.

[2] Turner, A. (n.d.). *How Many People Have Smartphones Worldwide (Oct 2021)*. BankMyCell. Retrieved November 28, 2021, from https://www.bankmycell.com/blog/how-many-phones-are-in-the-world

[3] D. Anguita, A. Ghio, L. Oneto, X. Parra, and J. L. Reyes-Ortiz. Human activity recognition on smartphones using a multiclass hardware-friendly support vector machine. In Ambient assisted living and home care, pages 216–223. Springer, 2012

[4] F Foerster, M Smeja, J Fahrenberg, Detection of posture and motion by accelerometry: a validation study in ambulatory monitoring, Computers in Human Behavior, Volume 15, Issue 5, 1999, Pages 571-583

[5] Tang, C., & Phoha, V. V. (n.d.). *An Empirical Evaluation of Activities and Classifiers for User Identification on Smartphones*. NSF PAR. Retrieved November 28, 2021, from https://par.nsf.gov/servlets/purl/10036391

[6] Sun, X. (2019, Oct 21). *Human Activity Recognition Using Smartphones Sensor Data | by Xiaoshan Sun*. Medium. Retrieved November 28, 2021, from https://medium.com/@xiaoshansun/human-activity-recognition-using-smartphones-sensor-data-fd1af142cc81

[7] Wu, Z., & Zhang, S. (n.d.). *Human Activity Recognition using Wearable Devices Sensor Data*. CS229. Retrieved November 28, 2021, from https://cs229.stanford.edu/proj2015/107_report.pdf

[8] Acampora G, Minopoli G, Musella F, Staffa M. Classification of Transition Human Activities in IoT Environments via Memory-Based Neural Networks. Electronics. 2020; 9(3):409. https://doi.org/10.3390/electronics9030409

[9] Acampora, G.; Foggia, P.; Saggese, A.; Vento, M. A hierarchical neuro-fuzzy architecture for human behavior analysis. Inf. Sci. 2015, 310, 130–148.

[10] Ronao, C.A.; Cho, S.B. Human activity recognition using smartphone sensors with two-stage continuous hidden Markov models. In Proceedings of the 2014 10th International Conference on Natural Computation (ICNC), Xiamen, China, 19–21 August 2014; pp. 681–686.

[11] Kozina, S.; Gjoreski, H.; Gams, M.; Lustrek, M. Three-layer Activity Recognition Combining Domain Knowledge and Meta-classification. J. Med. Biol. Eng. 2013, 33, 406–414

[12] Nurma, Intan & Saori, S. (2019). Human Activities and Postural Transitions Classification using Support Vector Machine and K-Nearest Neighbor Methods. IOP Conference Series: Earth and Environmental Science. 248. 012025. 10.1088/1755-1315/248/1/012025.

[13] Reyes-Ortiz, J.-L., Oneto, L., Sama, A., Ghio, A., Parra, X., & Anguita, D. (n.d.). Transition-Aware Human Activity Recognition Using Smartphones online_har.pdf (upc.edu)

[14] Website

:https://towardsdatascience.com/svm-implementation-from-scratch-python-2db2fc52e5c2 for

implementation of svm and understanding the svm parameter tuning

[15] Website 2: https://www.kaggle.com/prashant111/svm-classifier-tutorial - for svm

implementation

[16] Building an Ensemble Learning Model Using Scikit-learn:

https://towardsdatascience.com/ensemble-learning-using-scikit-learn-85c4531ff86a - for

ensemble model

[17] How to Apply K-means Clustering to Time Series Data:

https://towardsdatascience.com/how-to-apply-k-means-clustering-to-time-series-data-28d04a8f7da3 - for some inspiration for Dynamic Time Warping

[18] Cross-validation: evaluating estimator performance:

https://scikit-learn.org/stable/modules/cross_validation.html - for Forward Chaining Validation

and Time-series split

[19] Dimensionality Reduction (PCA and LDA) with Practical Implementation: Dimensionality Reduction(PCA and LDA) with Practical Implementation | by Amir Ali | Wavy AI Research Foundation | Medium

[19] CS 3244 teaching team for their help along the module we hope … ethical engineers