
Neural network approaches to Reality Mining: The Badge dataset

1 Description

One of the most challenging areas for the application of machine learning algorithms is Reality Mining [1], in particular the understanding of social dynamics from the analysis of data describing social interactions (e.g., data about mobile communications, coworking interactions, information exchange, computer use, etc.). Several recent projects have proposed experiments in which this type of data is collected [2, 3, 1, 4, 5] and a number of approaches that analyze this data have been also published [6, 7, 8, 9, 10, 11]. However, the question of exploring new and creative applications of machine learning in this domain is relevant.

In this project the students will use the *Badge Dataset* <http://realitycommons.media.mit.edu/badgedataset.html> [4] which contain the performance, behavior, and interpersonal interactions of participating employees at a Chicago-area data server configuration firm for one month. This was the first data set to contain the performance and dynamics of a real-world organization with a temporal resolution of a few seconds.

2 Objectives

The objective of this project is to apply one algorithm based on Neural Networks to the *Badge Dataset* dataset that allow to produce insights about the social interactions captured by the data. The student should: 1) Select the approach to apply to the data and the Python implementation to use. 2) Preprocess the data as required for the approach chosen. 3) Apply the algorithm, describe the results, and explain why these results are useful, interesting, or reveal any insight about the process. 4) Answer to the following questions in the report:

- What class of problems can be solved with the NN? (e.g., supervised vs unsupervised problems)
- What is the network architecture? (e.g., type and number of layers, parameters, connectivity, etc.).
- What is the rationale behind the conception of the NN?
- How is inference implemented? (e.g., How is the information extracted from the network?). Type of prediction or type of inference process.
- What are the learning methods used to learn the network ? Algorithms used for learning the network.

As in other projects, a report should describe the characteristics of the design, implementation, and results. A Jupyter notebook should include calls to the implemented function that illustrate the way it works.

3 Suggestions

- Read the description of the dataset in [4] and other papers that analyze this data.

- Think about what are relevant questions for the scenario that experiments covers. Determine whether the available NN approaches are useful to answer these questions.
- Select any of the available NN Python libraries and implement the idea.

References

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