Implementation of Multi-Label Classification in Sparse Matrices

Napoleon Maraidonis[1] under the supervision of Michalis Titsias[1]

1 Department of Informatics, Athens University of Economics and Business

Abstract

Fitting multiple figures into very tight manuscripts while keeping it pleasant to read is challenging. Therefore figures are often simply attached to the very end of a manuscript file. While easier for the authors, this practice is inconvenient for readers. This LaTeXtemplate shows how to generate a compiled PDF with figures embedded into the text. It provides several examples of how to embed figures or tables directly into the text thus giving you a range of options from which you should choose the one best suited for your manuscript. Check out Schlegel et al., (2016) as example of use [3] also [?].

Introduction

Introduction [1] [2] [4]

Notation

Lowercase bold letter denotes a n * k matrix where n is rows and k is columns $\mathbf{w} \in \mathbb{R}^{n*k}$
  Lowercase bold letter with subscript denotes the n-nth row of the matrix $\mathbf{x}_n \in \mathbb{R}^k$
  Lowercase letter will denote a real number unless stated otherwise $x \in \mathbb{R}$
  Uppercase Italics letter denotes a set T

Prototype Abstract Structure and Documentation

General Structure

The prototype consists of three main parts : (a) Multiclass Classification Algorithm, (b) Multy Label Classifiactation Interface (c) Score function. More specifically :

a   Firstly, the implementation of any Multiclass Classification Algorithm will be required: multiclass logistic regression was chosen for simplicity. The sparsity of the training data will be put into account while implementing the algorithm and stochastic gradient descent will be used for the optimization of the loss function.

b   Classifier chains [4] will be used.

c   Scoring will be made according to the formula:

$$accuracy \triangleq \frac{|T \cap P|}{|T \cup P|}$$

Notes

- The implementation of any Multiclass Classification Algorithm will follow the following contract : The methods train(Xtrain,Ytrain), and predict(Xtest) will be implemented.

- The implementation of any Multy Label Classifiactation Interface will follow the following contract using the implemented Multiclass Classification Algorithm : The methods train(Xtrain,Ytrain), and predict(Xtest) will be implemented.

Multiclass Logistic Regression Implementation

Results

Discussion

Acknowledgments

References

1. *Multiclass-Multilabel Classification with More Classes than Examples.* AISTATS, 2010.

2. Y. P. M. V. Kush Bhatia, Himanshu Jain. The extreme classification repository: Multi-label datasets and code.

3. J. Read. Multi-label classification. Technical report, Universidad Carlos III de Madrid. Department of Signal Theory and Communications, 2013.

4. J. Read. Multi-label classification. Technical report, Department of Information and Computer Science Helsinki, Finland, 2015.