Chapter 6
Conclusion

In this work, we presented some of the major recent advances of robust optimization in data mining. Through this monograph, we examined most of the data mining methods from the scope of uncertainty handling with only exception the principal component analysis (PCA) transformation. Nevertheless the uncertainty can be seen as a special case of prior knowledge. In prior knowledge classification, for example, we are given together with the training sets some additional information about the input space. Another type of prior knowledge other than uncertainty is the so-called expert knowledge, e.g., binary rule of the type "if feature a is more than M_1 and feature b less than M_2 then the sample belongs to class x." There has been significant amount of research in the area of prior knowledge classification [33, 49] but there has not been a significant study of robust optimization on this direction.

On the other side there have been several other methods able to handle uncertainty like stochastic programming as we already mentioned at the beginning of the manuscript. Some techniques, for example, conditional value at risk (CVAR), have been extensively used in portfolio optimization and in other risk related decision systems optimization problems [46] but their value for machine learning has not been fully investigated.

Application of robust optimization in machine learning would be an alternative method for data reduction. In this case we could replace groups of points by convex shapes, such as balls, squares or ellipsoids, that enclose them. Then the supervised learning algorithm can be trained just by considering these shapes instead of the full sets of points.

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