

Chapter 7¹

Predicting Wine Quality from Agricultural Data with Single-Objective and Multi-Objective Data Mining Algorithms

Mark Last¹, Sigal Elnekave¹, Amos Naor², and Victor Schoenfeld³

¹Dept. of Information Systems Engineering, Ben-Gurion University of the Negev, Beer-Sheva 84105, Israel. E-mail: {mlast, [elnekave](mailto:elnekave@bgu.ac.il)}@bgu.ac.il

²Golan Research Institute, University of Haifa, P.O. Box 97, Katzrin 12900, Israel
E-mail: amosnaor@research.haifa.ac.il

³Yarden - Golan Heights Winery, Katzrin, Israel, E-mail: victor@golanwines.co.il

Abstract: Wine quality is determined by a series of complex chemical processes. Factors affecting grape and wine performance range from climate conditions during the growing period to harvesting decisions controlled by humans. In this chapter, we apply single-objective and multi-objective classification algorithms for prediction of grape and wine quality in a multi-year agricultural database maintained by Yarden - Golan Heights Winery in Katzrin, Israel. The goal of the study is to discover relationships between 138 agricultural and meteorological attributes collected or derived during a single season and 27 dependent parameters measuring grapevine and wine quality. We have induced ordered (oblivious) decision-tree models from the target dataset using information-theoretic classification algorithms. The induced models, called *single-objective* and *multi-objective information networks*, have been combined into multi-level *information graphs*, each level standing for a different stage of the wine production process. The results clearly demonstrate the hitherto unexploited potential of the KDD technology for knowledge discovery in agricultural data.

Key Words: Winemaking, Agricultural data, Multi-objective classification, Information theory, Information graphs.

¹ Liao, T.W. and E. Triantaphyllou, (Eds.), **Recent Advances in Data Mining of Enterprise Data**, *World Scientific*, Singapore, pp. 323-365, 2007.