



Fig. 6. The fuzzy inference diagram obtained with the MATLAB Fuzzy Logic Toolbox

and material handling cost. FSAS enables the warehouse operators to perform put-away decision: (i) real-time decision support data with different query dimensions (ii) mimicking the warehouse manager to provide recommendation for SLAP.

Further research on enhancing the fuzzy rules generation is considered to improve the accuracy in assignment suitable storage location. The generation of fuzzy rules and the membership functions is currently defined by the experts. As the database is well developed for the put-away process in the DCAM, this is eligible to provide overview on the past performance of the warehouse. A scientific way like association rule could be employed to discover the hidden knowledge from the database for SLAP instead of only converting the knowledge into the system from human.

6. References

Brynzer H., Johansson M.I. (1996) Storage location assignment: Using the product structure to reduce order picking times, *Int. J. Production Economics* 46-47, pp. 595-603

Chen G., Pham T. T. (2006) *Introduction to Fuzzy Systems*. Boca Raton, FL: Chapman & Hall / CRC

Dunham M. H. (2002) *Data mining introductory and advanced topics*; Upper Saddle River, NJ: Prentice Hall/Pearson Education

Dayal U., Chaudhuri S. (1997) An overview of data warehousing and OLAP technology, *SIGMOD Record* 26 (1), pp.65-74.

Frazelle E. (2002) *World-class warehousing and material handling*, McGraw-Hill, New York

Giovinazzo W. A. (2002) *Internet-enabled business intelligence*. USA: Prentice Hall.

Gu J., Goetschalckx M., McGinnis L.F. (2007) Research on warehouse operation: A comprehensive review. *European Journal of Operational Research* 177, pp.1-21

Hausman W.H., Schwarz L.B., Graves S.C. (1976) Optimal storage assignment in automatic warehousing systems. *Management Science* 22 (6), pp.629-638.

James R. S., Douglas M. L. (2001) *Strategic Logistics Management*, 4th edition. New York: McGraw-Hill.

Lau H.C.W., Lau T.M., Tsui W.T. (2008) Item-Location Assignment Using Fuzzy Logic Guided Genetic Algorithms, *IEEE Transactions on Evolutionary Computation* 12(6), pp. 765-780.

Michael J.A. Berry, Gordon S. Linoff (2004). *Data mining Techniques*, 2nd edition, Indianapolis, Indiana: Wiley Publishing, Inc.

Muppani V.R., Adil G.K. (2008) A branch and bound algorithm for class based storage location assignment. *European Journal of Operational Research* 189, pp. 492-507

Pan J.C.H., Wu M.H. (2009) A study of storage assignment problem for an order picking line in a pick-and-pass warehousing system, *Computers & Industrial Engineering*, In Press, Corrected Proof, Available online 10 December 2008

Peterson T. (2000) *Microsoft OLAP unleashed*, 2nd ed. Indianapolis: Sams Publishing

Petrovic D., Duenas A., Petrovic S. (2007) Decision support tool for multi-objective job shop scheduling problems with linguistically quantified decision functions. *Decision Support Systems* 43, pp.1527-1538

Pham D. T., Oztemel E. (1996) *Intelligent quality systems / Duc Truong Pham and Ercan Oztemel*. London, New York, USA : Springer

Robert J. S. (1990) *Artificial Intelligence: An engineering approach*. New York: McGraw-Hill.