Fault diagnosis for an MSF desalination plant by using Bayesian networks

Enrique E. Tarifa[a]*, F. Núñez Álvaro[a], Samuel Franco[a], Sergio Mussati[b]

[a]*Universidad Nacional de Jujuy - CONICET, Gorriti 237, 4600 San Salvador de Jujuy, Argentina*
Tel. +54 3884221587; Fax +54 3884221581; email: eetarifa@arnet.com.ar
[b]*INGAR – CONICET, Avellaneda 3657, 3000 Santa Fe, Argentina*

ABSTRACT

This work outlines the development of a fault diagnostic system for an MSF (multi-stage flash) desalination plant by using BNs (Bayesian networks). This diagnostic system processes the plant data to determine whether the process state is normal or not. In the latter case, the diagnostic system determines the cause of the abnormal process state; i.e., it finds out which is the fault that is affecting the supervised process. A BN is a graphical model that encodes probabilistic relationships among variables of interest. When used in conjunction with statistical techniques, the graphical model has several advantages for data analysis. A BN readily handles situations where some data entries are missing. This paper determines both the structure and parameters of a BN intended for a diagnostic system. The implemented system is evaluated by using a dynamic simulator, which was developed for a real MSF desalination plant. Besides, the diagnostic system performance is compared with the performances of two other diagnostic systems. The obtained results show some advantages for the BN based diagnostic system.

Keywords: Fault diagnosis; Bayesian networks; Dynamic simulation; MSF desalination plant

* Corresponding author.