Processi, prodotti e servizi
Processes, products and sercice

DII research group
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Turning "big data" into business - The pharma industry case study

Pharmaceutical industries are known as "data rich - information poor" environments. Modern pharmaceutical manufacturing systems are hooked to computers that collect and store the measurements coming from sensors distributed all over the plant. The number of sensors is relatively large, and the measurements are made available at relatively high frequency (typically, one measurement every few seconds). Therefore, the number of data entries that are made available during a production campaign easily reaches the order of hundreds of millions. These data contain a wealth of information that can be extremely useful to optimize the performance of the manufacturing system. However, due to the data overload, extracting the information is not an easy task, so that this information remains largely unexploited.

The CAPE-Lab group has considerable expertise in the analysis of historical sets of manufacturing data to support the periodic review of manufacturing systems. As an example, a methodology based on the use of pattern recognition techniques coupled to multivariate statistical analysis has been recently been developed to support process optimization in a multinational "big pharma" company. Several operations have been made completely automatic, such as: detection of how many lots have been processed in a given manufacturing campaign (Figure 1.a); characterization of the process evolution in each lot (Figure 1.b); comparison of the evolution of the manufacturing across different lots (Figure 1.c). The methodology has been tested with excellent results on a twelve-month historical dataset coming from a commercial-scale granulation/drying system manufacturing a set of drugs. A prototype code has been developed that is being used by the company to identify of possible areas of improvement in secondary manufacturing operations.

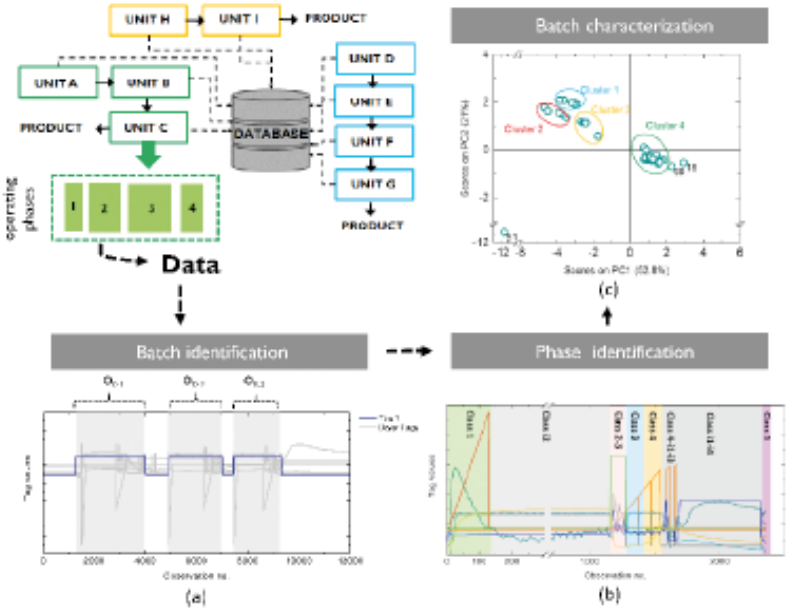

Figure 1. Main steps of the methodology proposed to analyse historical manufacturing data (Meneghetti, N., P. Facco, F. Bezzo, C. Himawan, S. Zomer, M. Barolo, 2016. Knowledge management in secondary pharmaceutical manufacturing by mining of data historians – A proof-of-concept study. *Int. J Pharm.*, **505**, 394–408)

Investigation conducted in collaboration with Dr. Simeone Zomer and Dr Chrismono Himawan - GlaxoSmithKline R&D

Main research topics:

- Product design and quality control
- Data anlysis and process control
- Mode development and identification
- Design of energy systems