

The challenge consists in the use of a big quantity of available data to predict textile parameters, by developing a prediction model that considers different material conditions – greige and dipped. Mathematically, the problem can be described as given  $x \in [(R, Z)]^n$  and  $y \in [(R, Z)]^m$ ,  $n > m$ , related by an unknown function  $f : R^n \rightarrow R^m$ , an approximate function (prediction model)  $\tilde{f}^{-1}$  of  $f^{-1}$  is to be obtained. The available of a big quantity of data for  $x$  and  $y$  allows to obtain  $\tilde{f}^{-1}$  (or  $\tilde{f}$ ) by using approximation techniques (e.g., neural networks). The approximate function  $\tilde{f}^{-1}$  is to be used to predict  $\bar{x}$  values, obtained from  $\tilde{f}^{-1}(\bar{y})$ . Given  $\bar{y}$ , the possible non injectivity of  $f$  may result in several values for  $\bar{x}$ , which may require to solve the optimization problem  $\{\min_x g(x), s.t. \tilde{f}(x) = \bar{y}\}$ , so a unique solution is to be obtained. The objective function  $g(x)$  is a performance measure, like, for example, the textile shrinkage.