

Concept drift is known as an unforeseeable change in underlying streaming data distribution over time. The phenomenon of concept drift has been recognized as the root cause of decreased effectiveness in many decision-related applications. A promising solution for coping with persistent environmental change and avoiding system performance degradation is to build a detection and adaptive system. This talk will present a set of methods and algorithms that can effectively and accurately detect, understand, and adapt to concept drift. The main contents include (1) two novel competence models to indirectly measure variations in data distribution through changes in competence. By detecting changes in competence, differences in data distribution can be accurately detected and quantified, then further described in unstructured data streams; (2) algorithms for determining a drift region to identify when and where a concept drift takes place in a data stream, and a local drift degree measurement that can continuously monitor regional density changes. (3) a fuzzy adaptive regression approach to dynamically recognize, train, and store patterns. The approach assigns the membership degree of the upcoming examples belonging to these patterns to identify which pattern the current examples belong to during the modelling process. The new algorithms and techniques can be applied to data-driven prediction in complex real-world environments.