A Forecast of the S&P/Case-Shiller Home Price Index for Los Angeles by Use of Genetic Programming-/Neural Network-Multi-Agent System

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Abstract

The economic impacts of temporal changes in residential home prices are well documented. Cyclical fluctuations in real estate prices in one country affect its own economy as well as others all over the world. Changes in home prices play a significant role in determining homeowners’ abilities to borrow and spend and therefore impact general economic conditions one way or the other. Successful decision-making by home-owners, lending institutions, and real estate developers among others is dependent on obtaining reasonable forecasts of residential home prices. For decades, home-price forecasts were produced by agents utilizing academically well-established statistical models. In this paper, several modeling agents will compete and cooperate to produce a single forecast. A cooperative multi-agent system (MAS) is developed and introduced here. It is used to obtain monthly forecasts (April 2008 through March 2010) of the S&P/Case-Shiller home price index for Los Angeles, CA (LXXR). Monthly housing market demand and supply data including conventional 30-year fixed real mortgage rate, real personal income, cash out loans, homes for sale, change in housing inventory, and construction material price index are used to find independent models that explain percentage change in LXXR. A multi-agent model then combines the forecasts obtained from the different agents to find a best one. The construction is basically a progression defined in three stages. In the first, what may be perceived as the best variables that would explain variations in the monthly percentage change in the LA index are identified employing an agent who relies entirely on genetic programming to accomplish the task. In the second stage, agents employing genetic programming and neural network are commissioned to produce forecasts of the input variables identified in the first stage. In the third, agents compete and cooperate to produce a set of forecasts from which a final forecast is identified.