At present, mix-burning of coal slime in a circulating fluidized bed boiler is an effective method to cleanly utilize low-price coal slime. This study proposed a data-based operation cost optimization system for mix-burning coal slime CFB boiler unit that instructs operators to more scientifically adjust the operation parameters. Based on actual operating data from a 300MW CFB unit, least squares support vector machine was used to build the steady-state operation cost model, and partial mutual information variable selection method was applied to choose the input variables and lower the model complexity. Based on the pre-built operation cost model, the genetic algorithm was used to establish an offline expert knowledge database within the safety threshold range. The utility cost was introduced into association rule measurement standards to improve the traditional fuzzy association rules mining. The improved fuzzy association rule mining was used to extract the associations between the unit load and the optimal operation parameters from the off-line expert knowledge database after receiving the load instruction, so as to achieve fast instruct on online operation optimization. Results showed that the proposed economic optimization system performances were better than traditional methods and can improve operation of the unit being studied.