

Data-Driven Insights Into Juvenile Recidivism: Leveraging Machine Learning for Rehabilitation Strategies

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Abstract : Juvenile recidivism presents a significant challenge to the criminal justice system, impacting both the individuals involved and broader societal safety. This study aims to identify the key factors influencing recidivism and successful rehabilitation outcomes by utilizing a dataset of over 25,000 individuals from the NIJ Recidivism Challenge. We employed machine learning techniques, particularly Random Forest Classification, combined with SHAP (SHapley Additive exPlanations) for model interpretability. Our findings indicate that supervision risk score, percent days employed, and education level are critical factors affecting recidivism, with higher levels of supervision, successful employment, and education contributing to lower recidivism rates. Conversely, Gang Affiliation emerged as a significant risk factor for reoffending. The model achieved an accuracy of 68.8%, highlighting its utility in identifying high-risk individuals and informing targeted interventions. These results suggest that a comprehensive approach involving personalized supervision, vocational training, educational support, and anti-gang initiatives can significantly reduce recidivism and enhance rehabilitation outcomes for juveniles, providing critical insights for policymakers and juvenile justice practitioners.

Keywords : juvenile, justice system, data analysis, SHAP

Conference Title : ICDAIE 2024 : International Conference on Data and Artificial Intelligence Engineering

Conference Location : Chicago, United States

Conference Dates : October 03-04, 2024