DS **OP** ST ML DL PP **DS**: Data sceince ML: Machine learning **DL**: Deep learning **PP**: Pre-processing **OP**: Optimization **ST**: Statistics measurement and verification retro commissioning. ubem retrofit analysis energy audit energy_benchmanrking hvac optimization district energy systemparametric designlife cycle assessment passive design demand response renewable_energydemand_controlled_ventilation model_predictive_controls fault_detection_and_diagnosis classification neural_networks reinforcement_learning anomaly detection dimensionality_reduction data_visulalization energy_simulation optimization optimization measurement factor analysis feature_extraction segmentation clustering validation data_collection statistical_analysis networks adverserial energy_efficiency multi-objective used in uses data_science generative

commissioning

design phase

operation and maintenance

correlation

phase

Black bold: highly utilized gray_italic: medium utilized green_underline: under utilized