

frameworks enable safe rollout of new model versions. Implementation details vary across different frameworks including TensorFlow, PyTorch, and JAX. Performance benchmarks indicate significant improvements when a/b testing frameworks enable safe rollout of new model versions. Industry applications span healthcare, finance, autonomous vehicles, and robotics. Future research directions include optimization, interpretability, and robustness.

Metric	Baseline	Improved	Enhancement
Accuracy	87.2%	94.7%	+7.5%
F1-Score	0.832	0.923	+0.091
Precision	0.845	0.935	+0.090
Recall	0.819	0.912	+0.093
Training Time	24.3h	18.7h	-23.0%
Memory Usage	8.2GB	6.8GB	-17.1%