

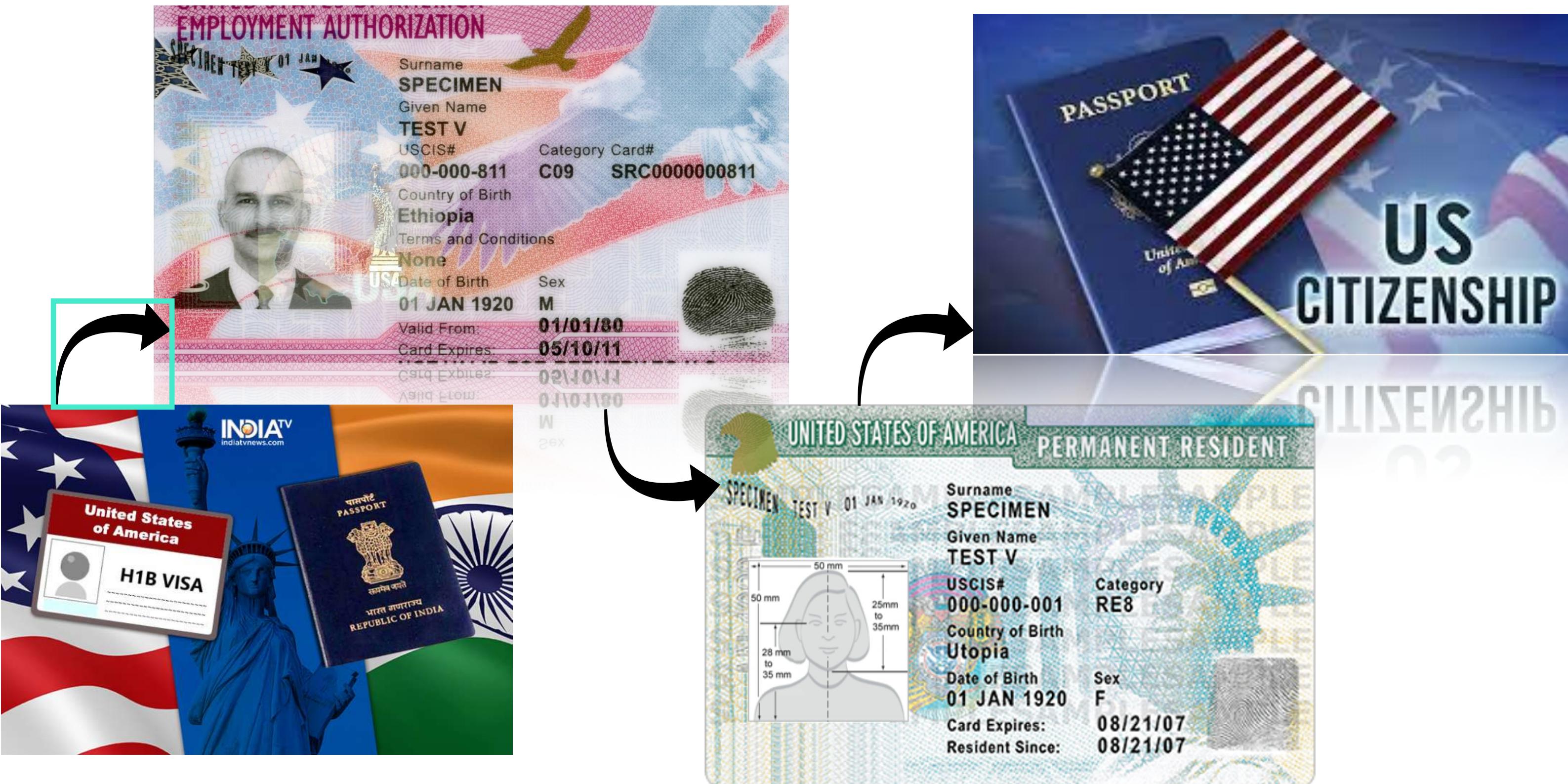
U.S. PERMANENT LABOR CERTIFICATION

Predicting application results through
Machine Learning Classification

JON YU - AUGUST 6, 2021

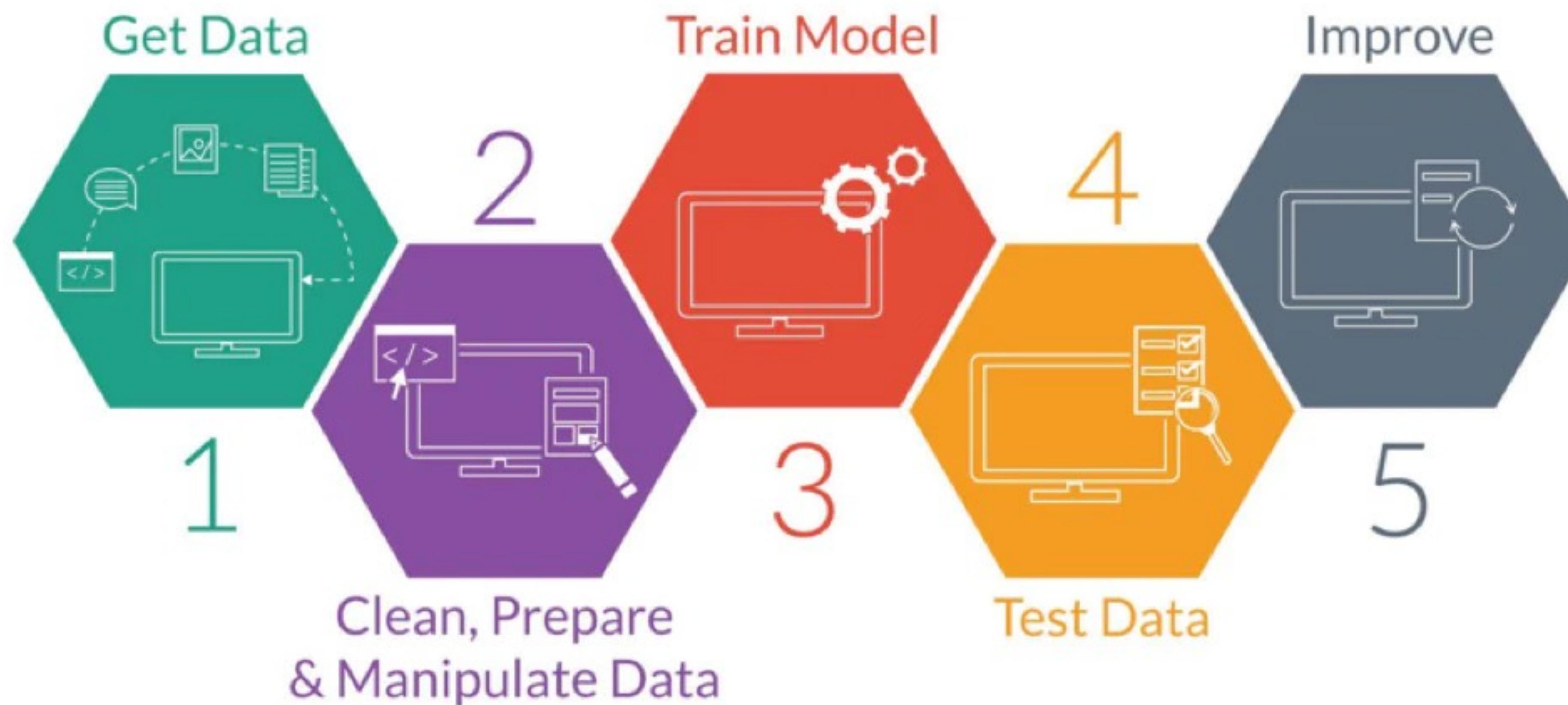


INTRODUCTION

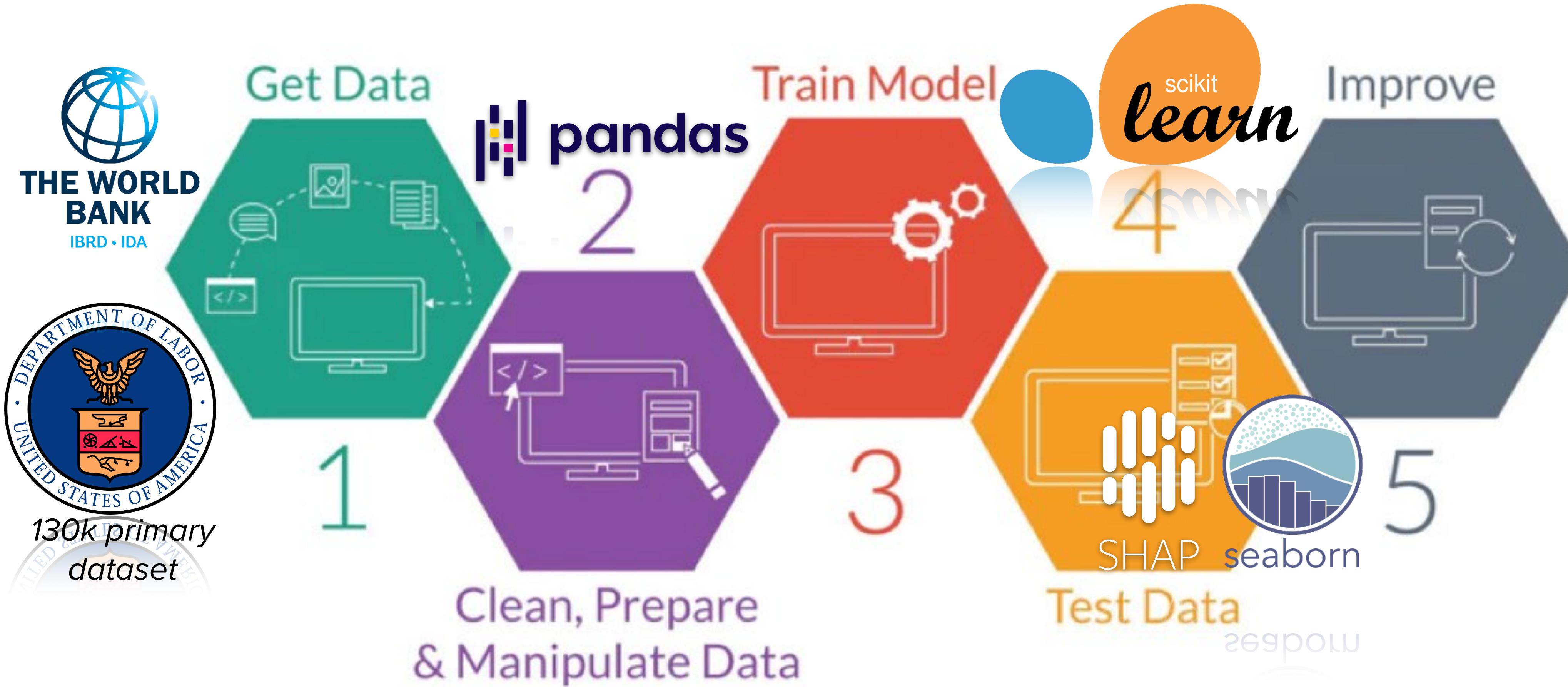


- Permanent Labor Certification serves as a stepping stone
- Eliminates repeated anxiety with temporary (H1B, TN, etc.) visa renewal for skilled foreign workers
- Motivation: provide employers and employees alike a predictive metric to determine risk of Perm Labor Cert application being declined

DATA & METHODOLOGY



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DATA & METHODOLOGY

- True Class = application denied
- False Class = application approved
- Goal: Minimize FALSE NEGATIVE
(Maximize Recall)

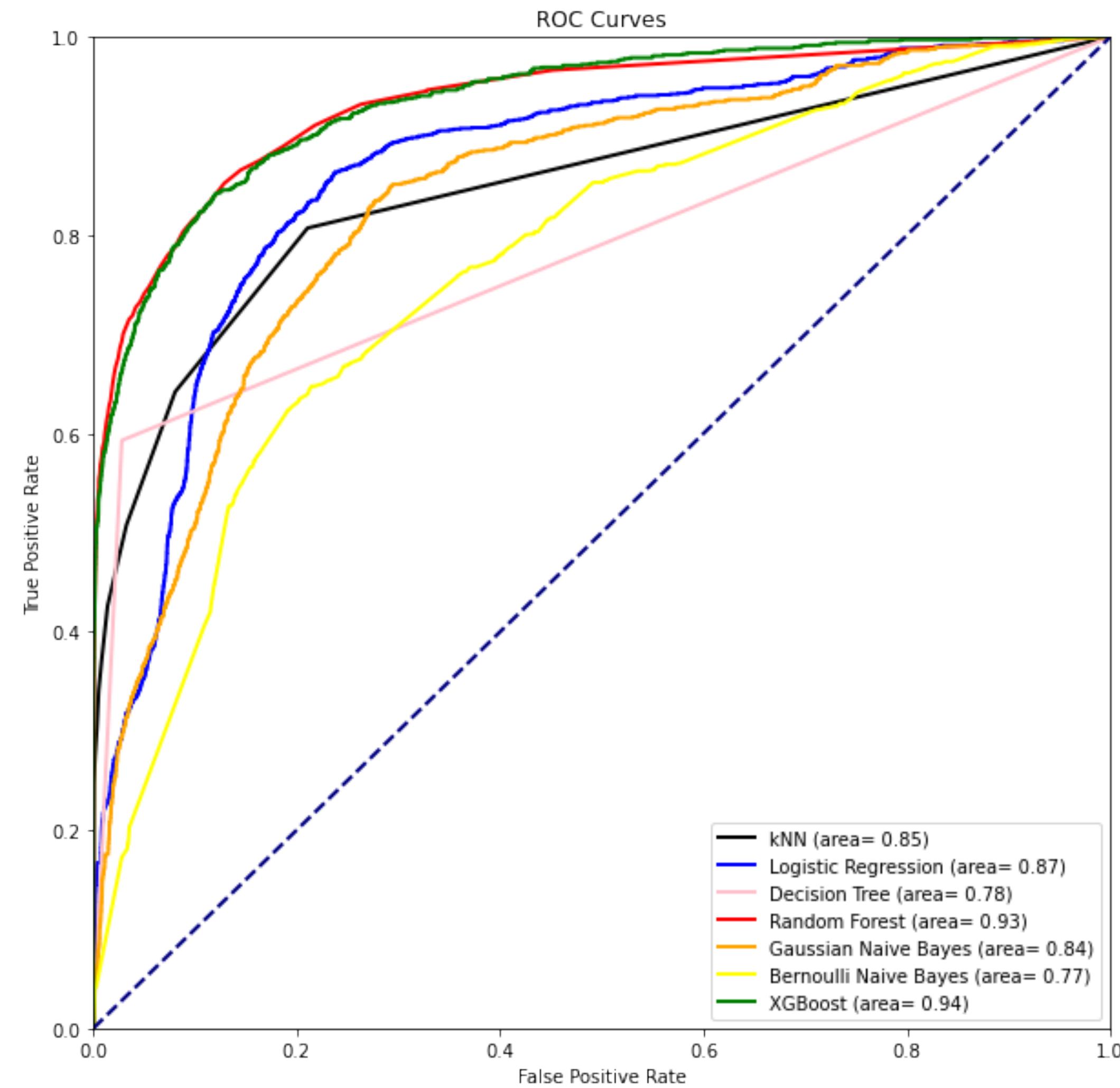
$$\text{Recall} = \frac{tp}{tp + fn}$$

Breakdown of Processed Applications



Heavy Class Imbalance!

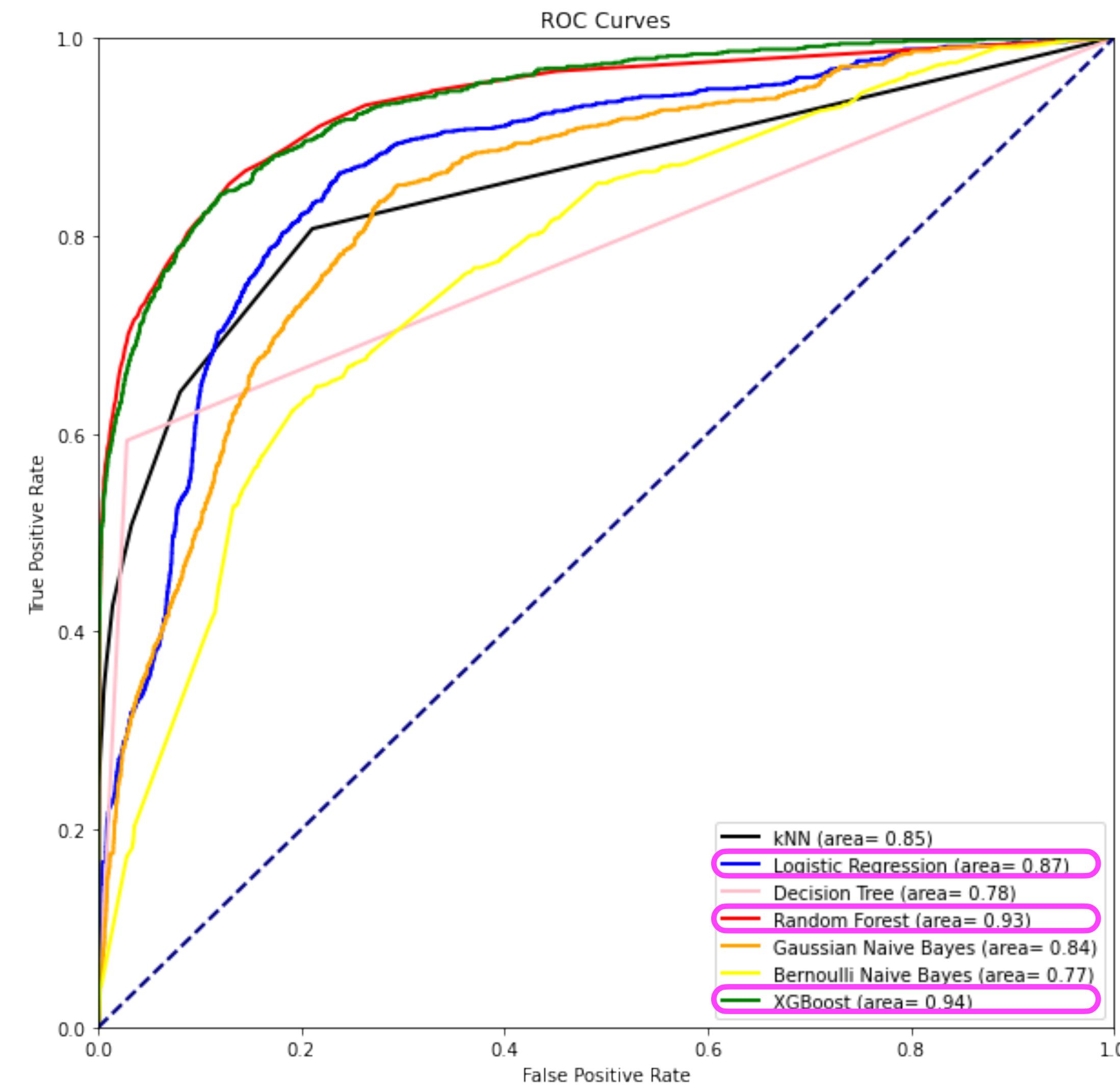
RESULTS



RESULTS

Top 3 Models (by AUC)

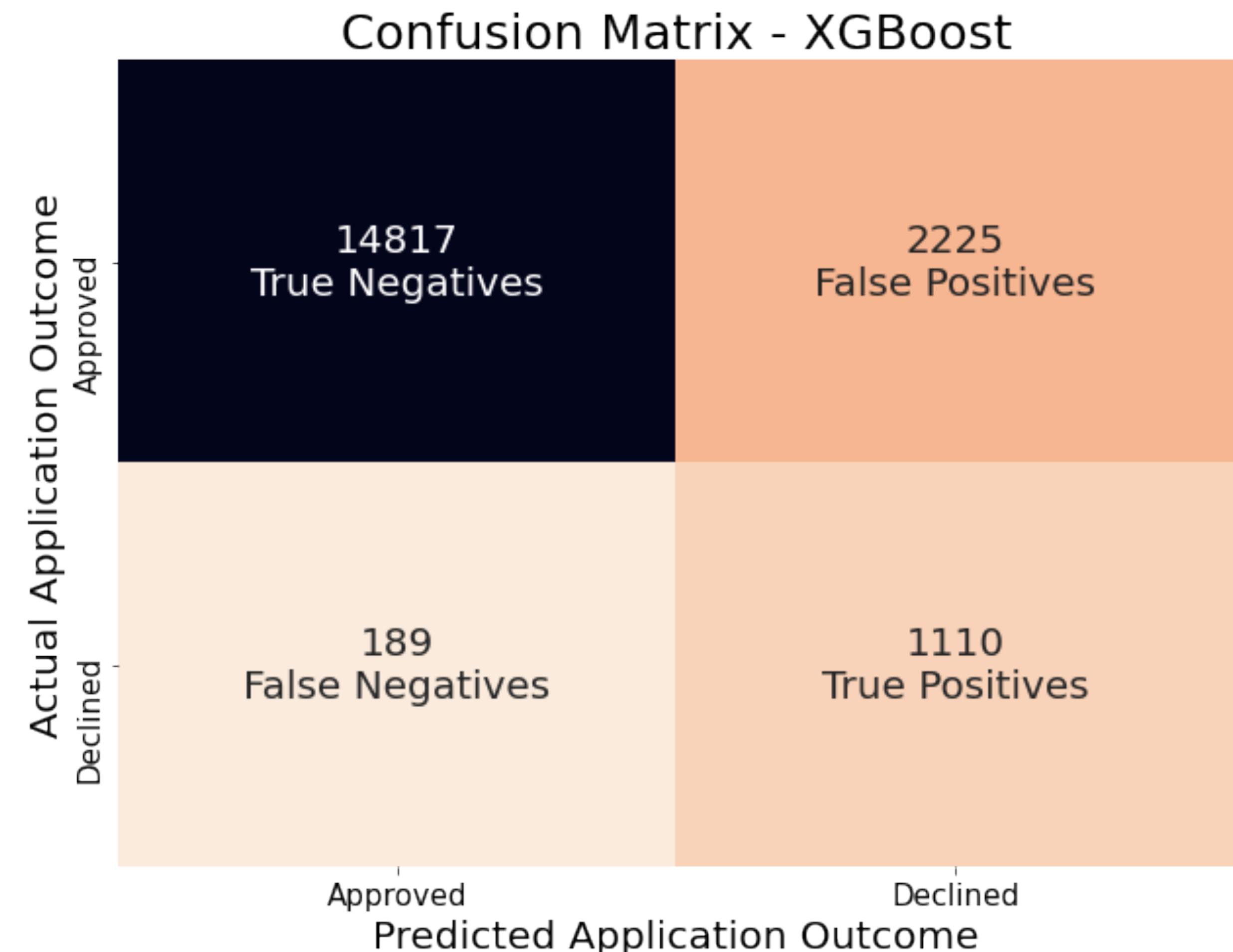
- 1) XGBoost (0.94)
- 2) Random Forest (0.93)
- 3) Logistic Regression (0.87)



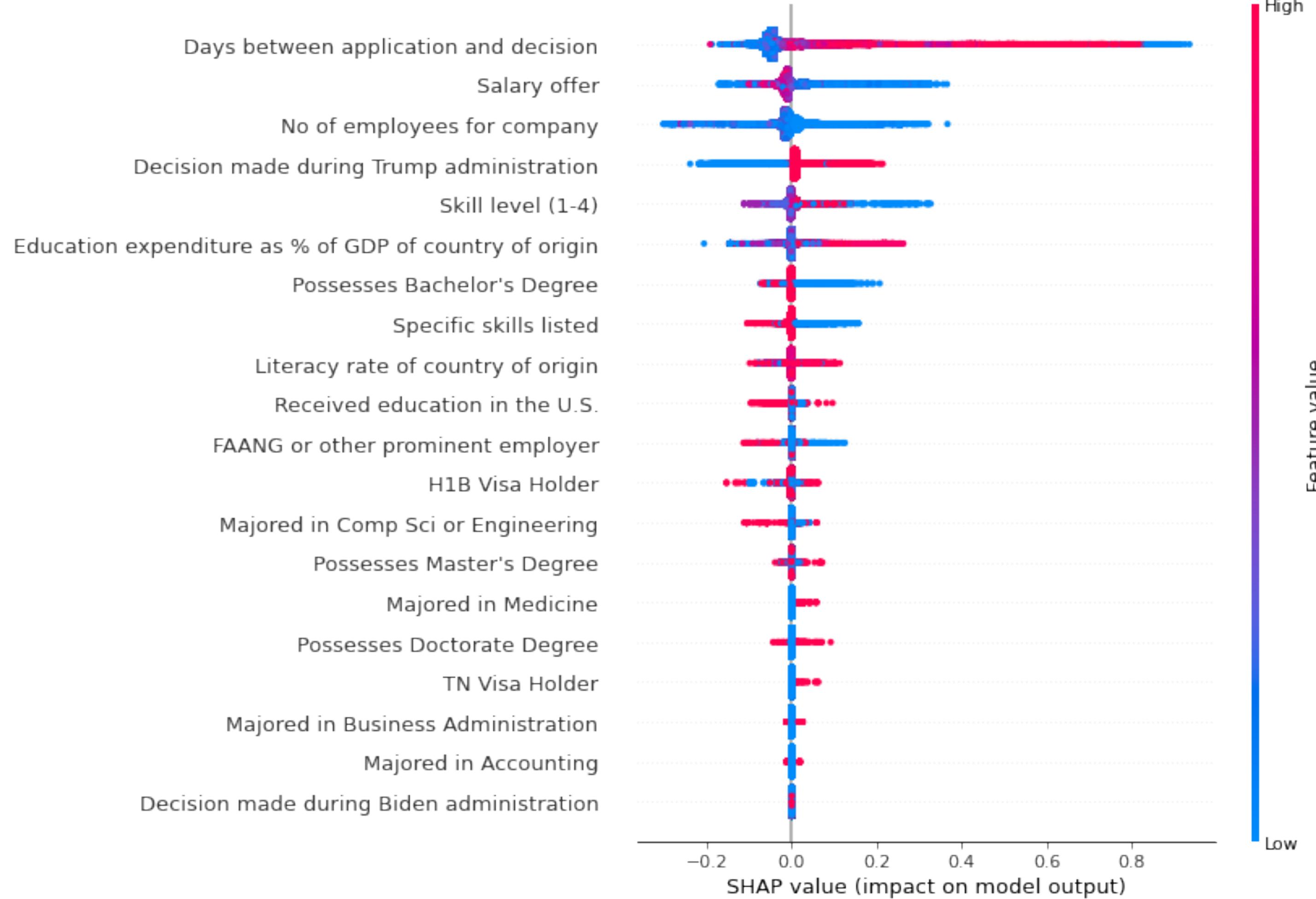
RESULTS

	Baseline	Tuned XGBoost
AUC	0.87	0.93
F1	0.39	0.48
Recall	0.79	0.85

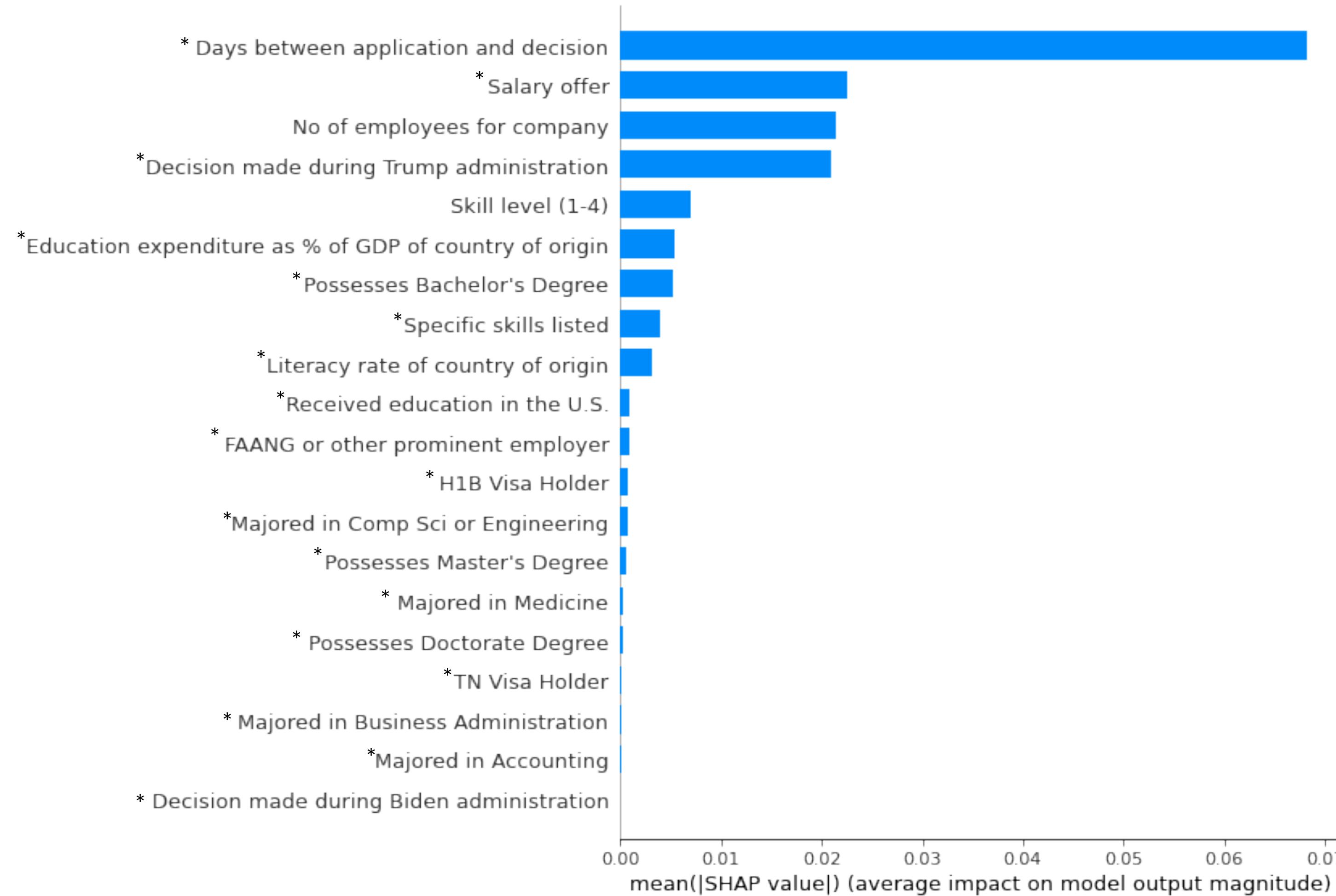
	Validation	Test
AUC	0.93	0.93
F1	0.46	0.48
Recall	0.83	0.85



RESULTS



CONCLUSIONS



- XGBoost offers best classification metrics with hyper parameter tuning
- Biggest contributors to application outcome are
 - 1) Days elapsed between application and decision (interpretive)
 - 2) Salary offer (predictive):
Higher salary = increased likelihood of acceptance
 - 3) Number of employees at company (predictive):
Larger company = increased likelihood of acceptance
 - 4) Whether or not decision was made during Trump administration (interpretive)
 - 5) Skill level of applicant (predictive):
Higher skill level = increased likelihood of acceptance
 - 6) Education expenditure of applicant's country of origin (predictive):
Higher spending = increased likelihood of acceptance

* Derived through Feature Engineering

FUTURE WORK

- Seek out more continuous feature variables from World Bank Open Data
- Check models against application data from Obama / Bush administrations
- Deploy machine learning model to web via Streamlit Share