

COMBATTING HUMAN TRAFFICKING

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PRESENTATION OVERVIEW

01

BACKGROUND

02

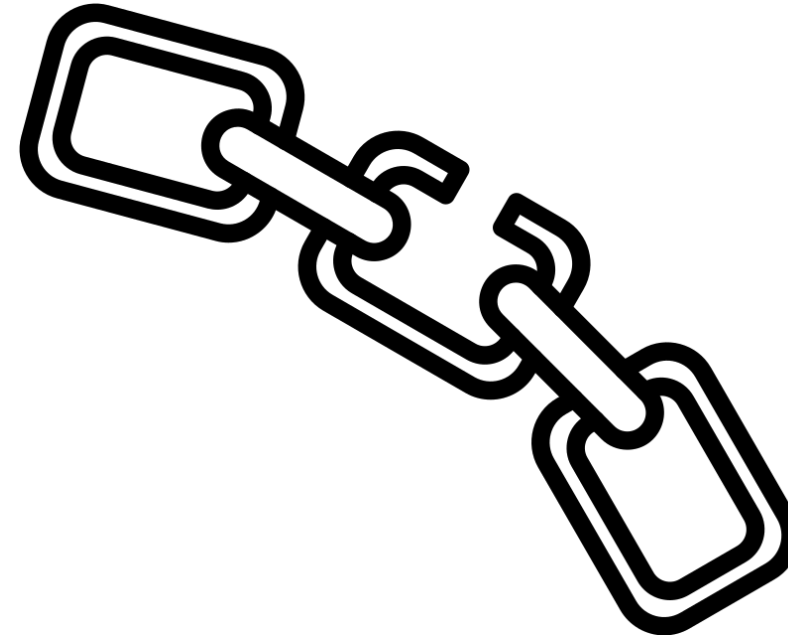
RESEARCH QUESTION

03

ETHICAL IMPLICATIONS

04

HYPOTHESIS



05

DATA / ANALYSIS

06

APPLICATION

07

DRAWBACKS

08

NEXT STEPS

PROBLEM

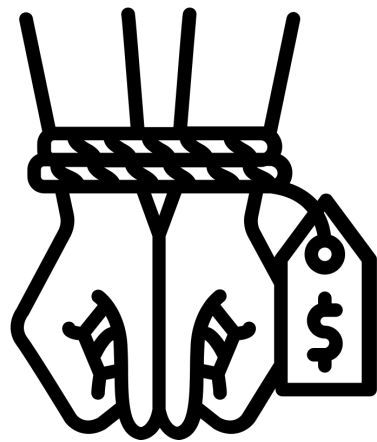
- Crime involving violation of human rights
- Public health concern
- Severely underreported



SCOPE

Human Trafficking is a global issue with permeating effects

VICTIMS



25-50M victims

COUNTRIES



Linked to 188 of
193 countries

MONEY



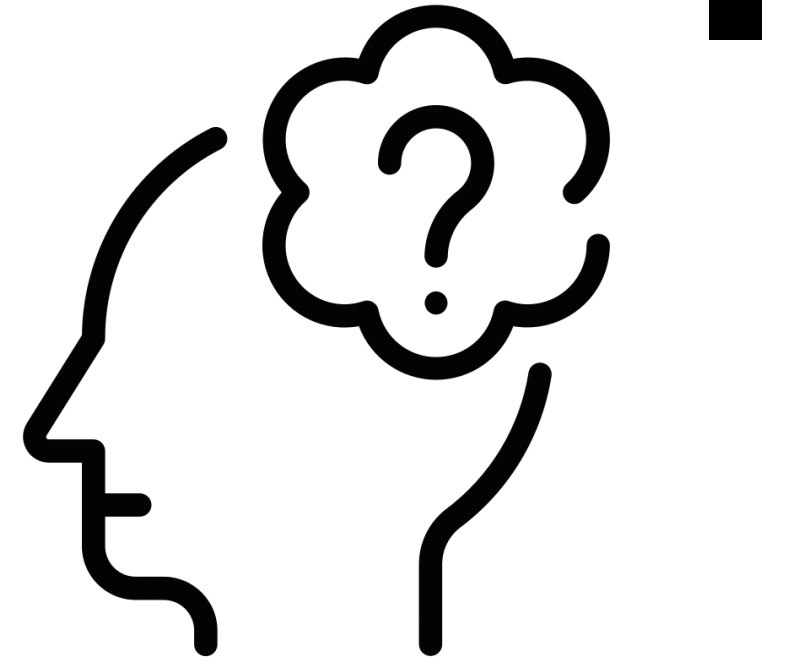
\$150B industry
Worth As Much As
IBM

WHY DATA SCIENCE APPROACH?



- Global Impact
- New Public Data
- Pattern Recognition

RESEARCH QUESTION



Are we able to accurately
predict trafficking
victims' destinations?

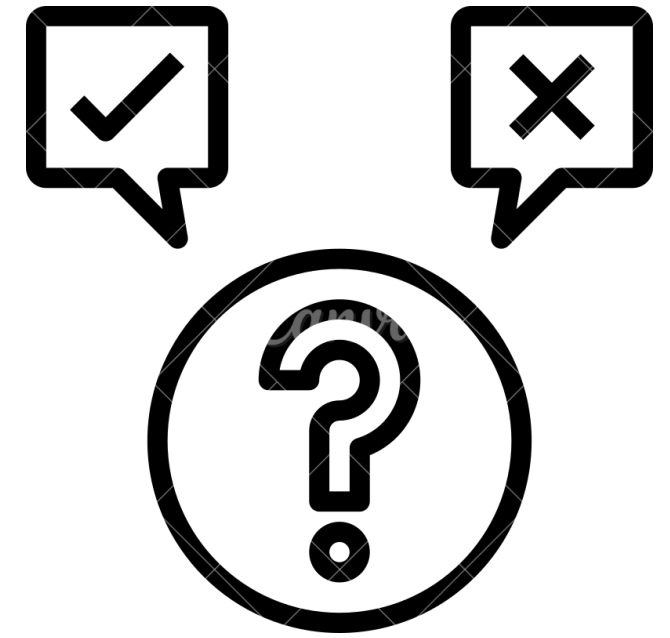


ETHICAL IMPLICATIONS



- Identification
- Mis-classifying
- Use of findings
 - Inadvertent, harmful

HYPOTHESES



We CAN accurately predict:

Where victims are being trafficked to

DATA SOURCES

Counter Trafficking Data Collaborative (CTDC) Dataset

- Victim data collected from consenting orgs

Human Trafficking Indicator (HTI) Data

- Country features + HT policing info



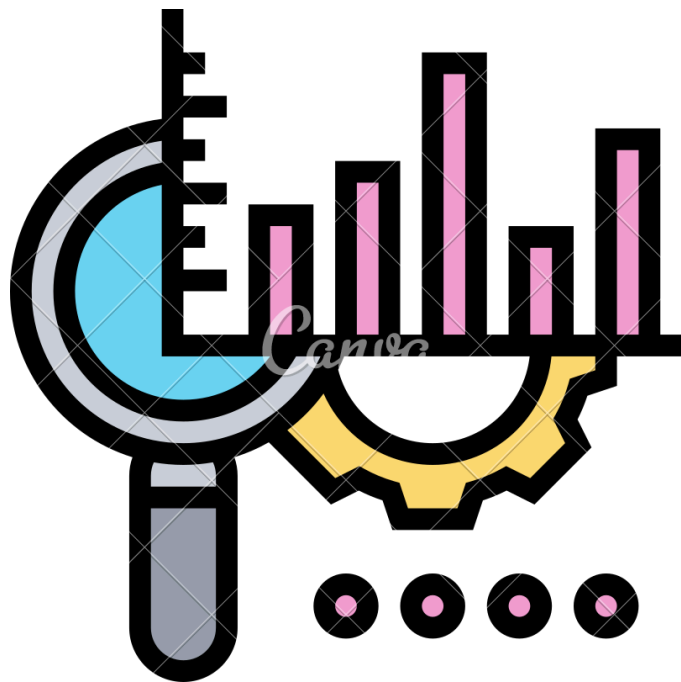
DATA VARIABLES

CTDC

- Gender
- Age Range
- Citizenship
- Country Of Exploitation

HTI

- Tier Placement
- Internal
- Level of Enforcement
- Protection Progress
- Victim Services



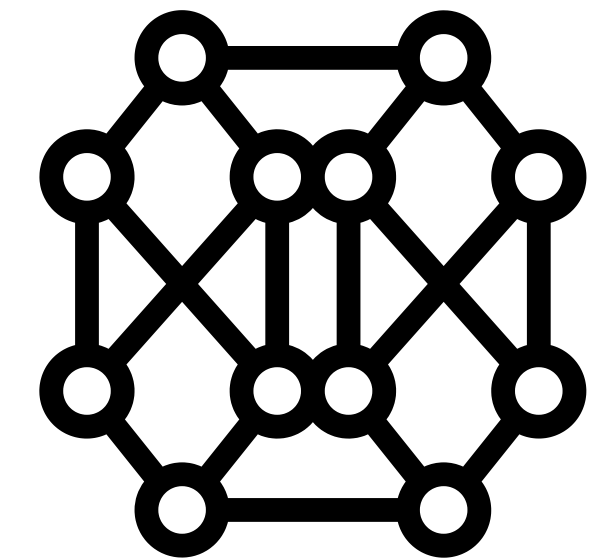
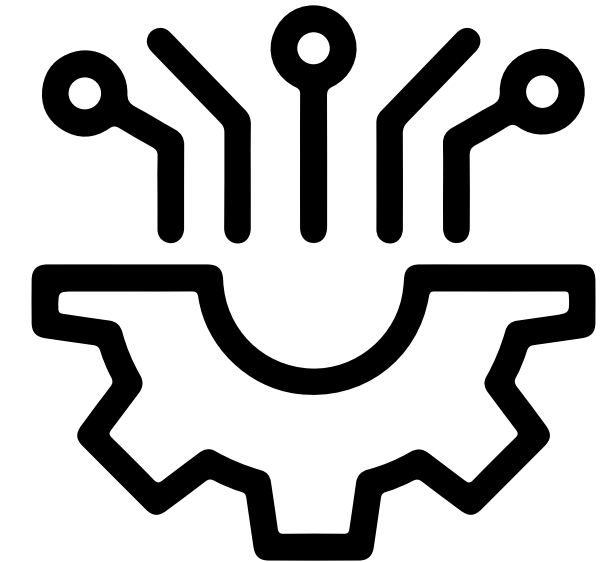
METHODOLOGY

DECISION TREE

- Analyze feature importance
- Accuracy: 80%
- F1 Score: .22

MLP CLASSIFIER

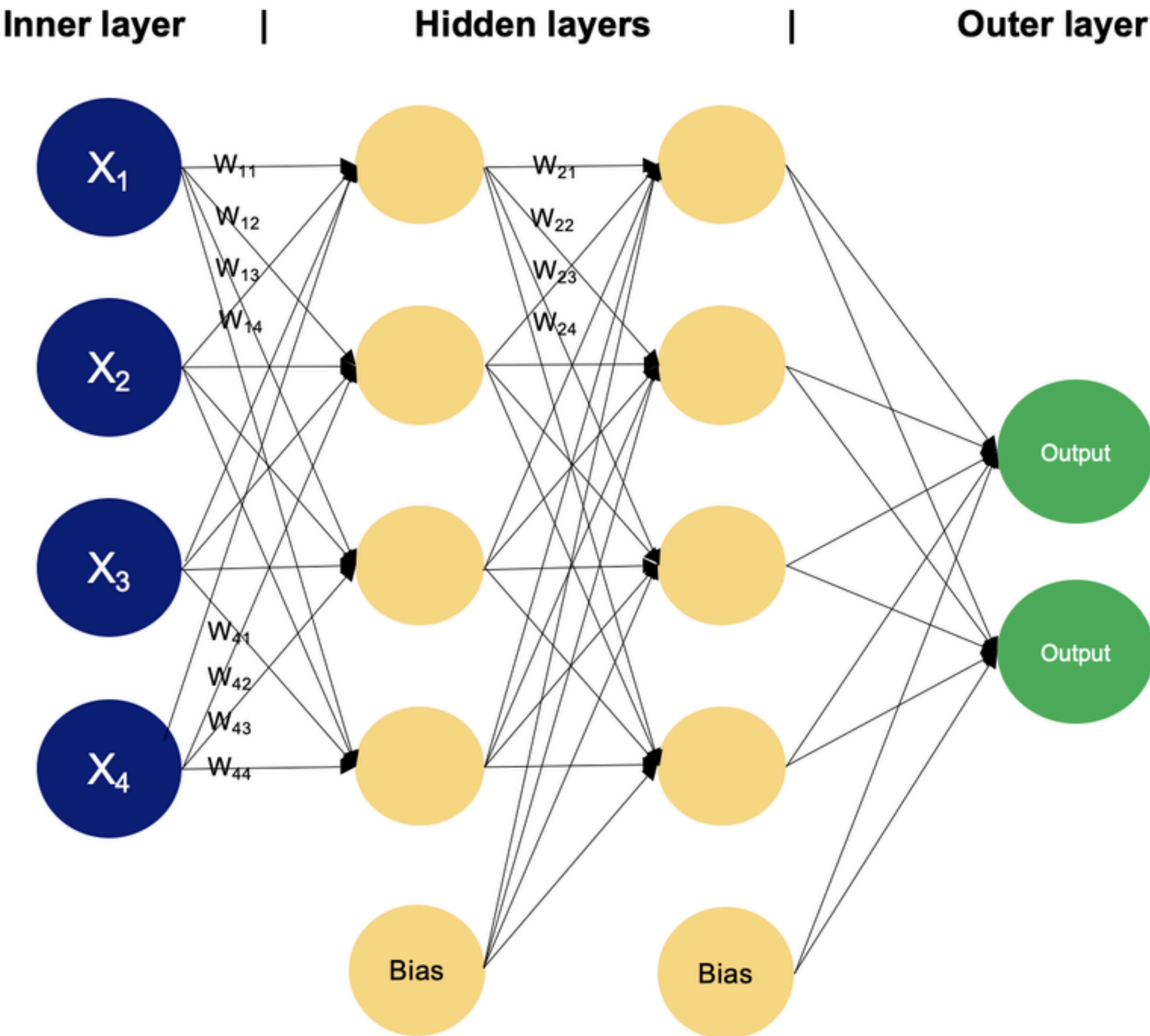
- Main Classifier
- Accuracy: 80%
- F1 score: .77

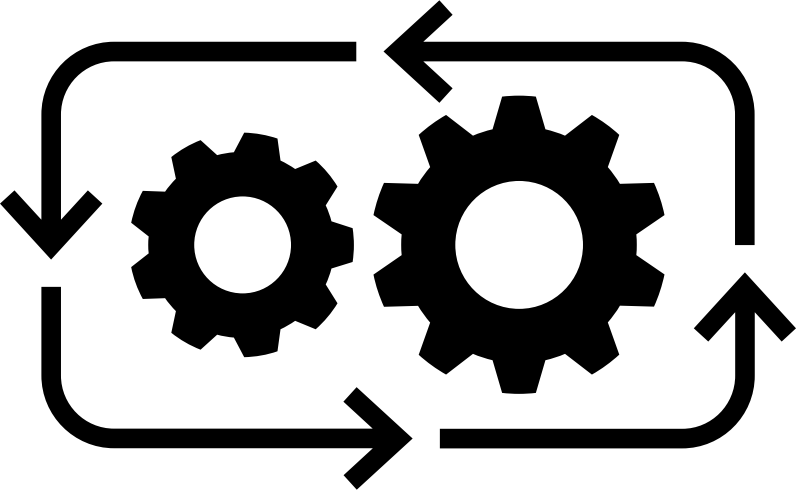


MLP CLASSIFIER

WHAT IS MLP CLASSIFIER?

- MLP (MULTI LAYER PERCEPTRON)
- MLP IS A NEURAL NETWORK
- IT SPECIALIZES IN CLASSIFYING COMPLEX NON LINEAR SEPERABLE RELATIONSHIPS
- INCLUDES A BIAS NEURON WHICH ALLOWS THE MODEL TO LEARN AN OFFSET OR BIAS





Parameters Used

MLP NN

PARAMETERS:

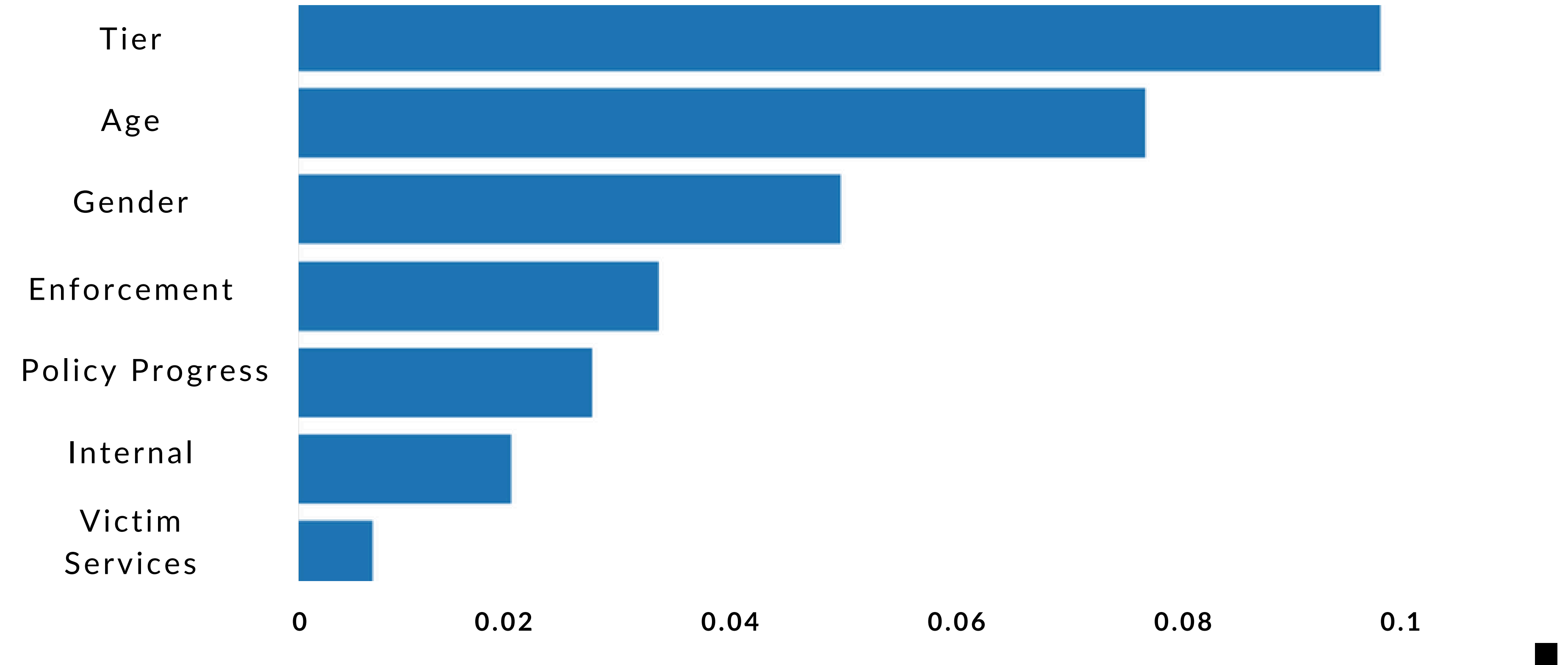
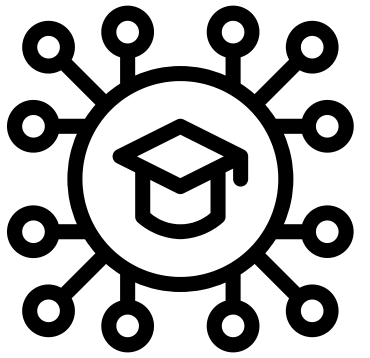
- **OBTAINED WITH CV**
- **TANH ACTIVATION**
- **40 HIDDEN LAYERS**
- **.05 LEARNING RATE**

DTREE

PARAMETERS:

- **ENTROPY BASED**
- **NO DEPTH LIMIT**

FEATURE IMPORTANCE

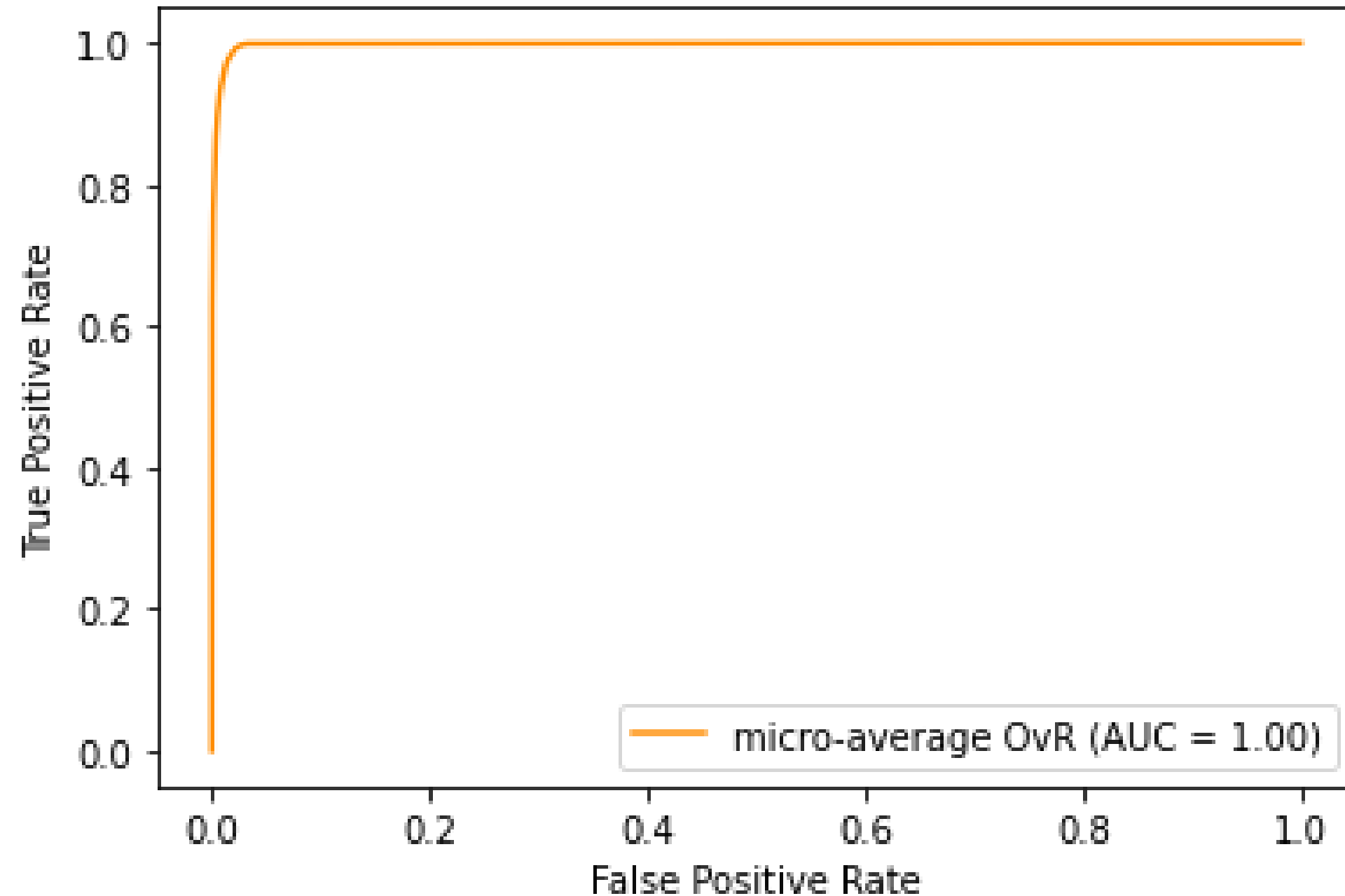


ROC/AUC

Decision Tree

Auc: .997

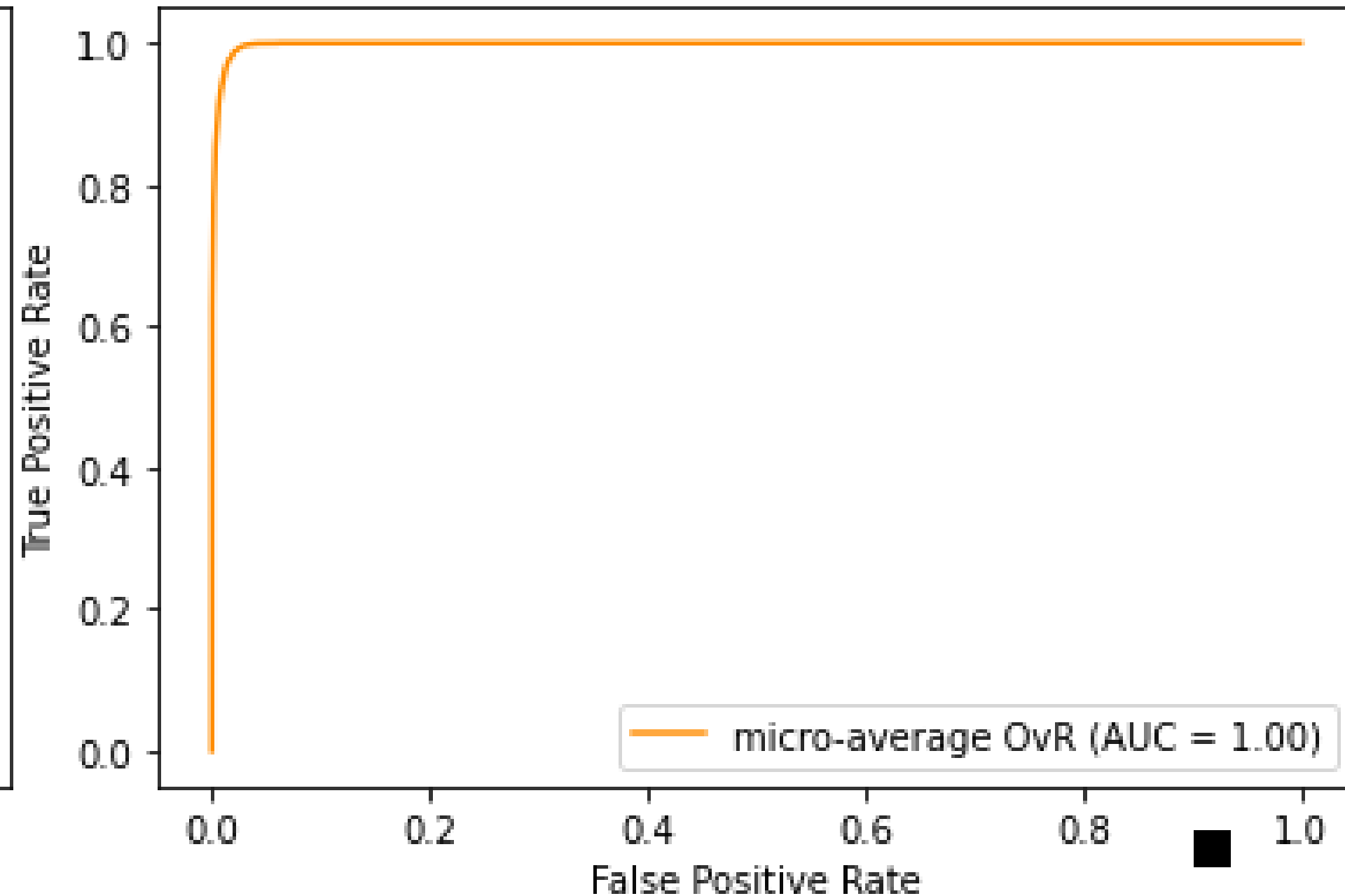
Micro-averaged One-vs-Rest
Receiver Operating Characteristic



Neural Network

Auc: .998

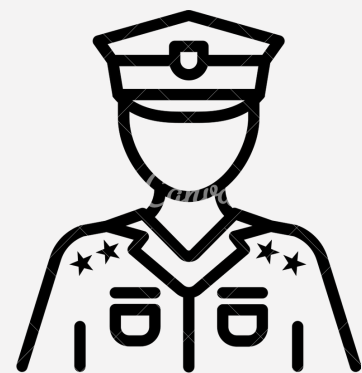
Micro-averaged One-vs-Rest
Receiver Operating Characteristic



APPLICATION

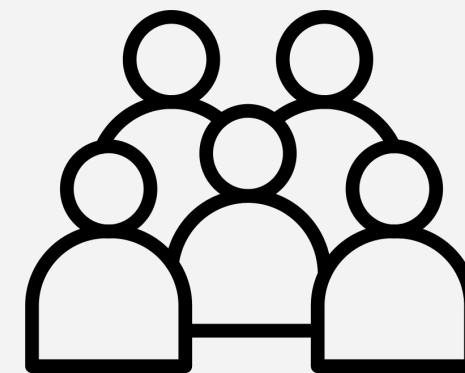
Tool for Police Forces

- Aid law enforcement in fight against exploitation
- Intended for action – not prevention

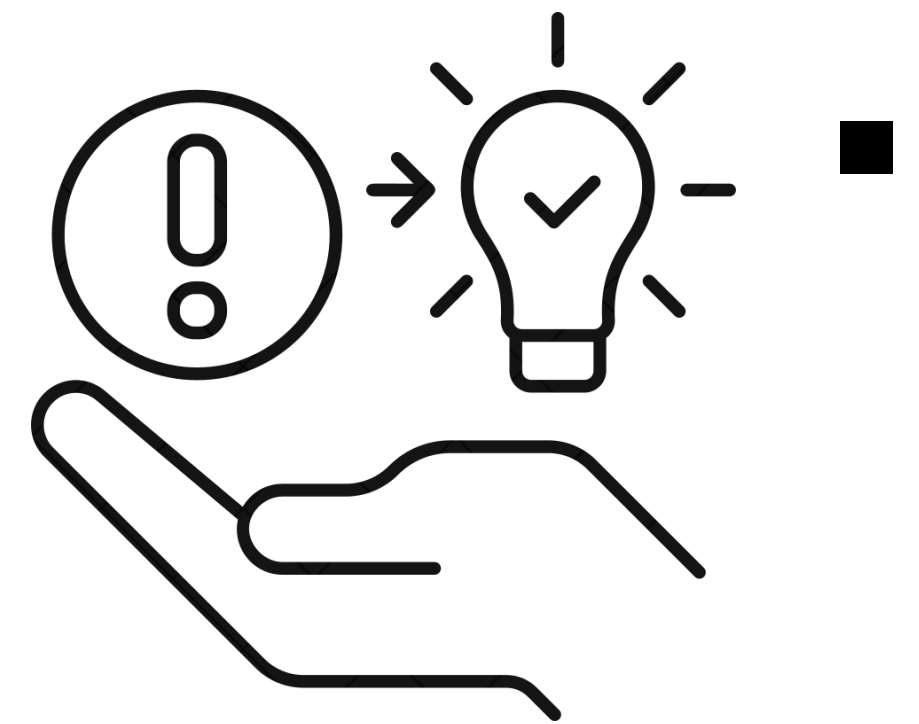


Widespread Use

- Publicize work & findings
 - Jump-start police/gov't use
 - Spread awareness



DRAWBACKS



DATA RELIABILITY

Since it is not
government provided



LIMIT IN DATA OVERLAP

HTI dataset only
goes to 2017



MISSING VALUES

Age missing in
~90,000 rows





NEXT STEPS

Continuing Tool
Development

Build Models For
Deployment

Research Real World
Results

Adjust Based On Real
World Findings



THANK YOU

Questions?

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