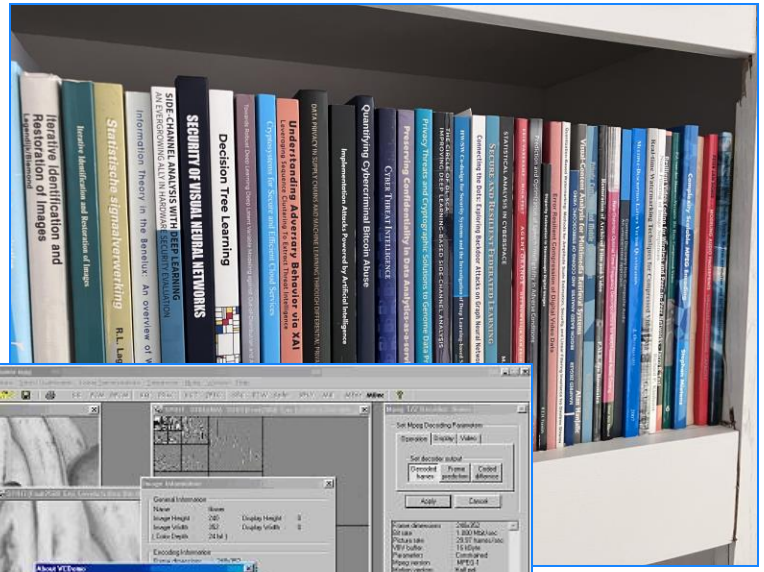
# WHAT IS IMPORTANT IN AI TODAY?

Inald Lagendijk

Founder AI Coalition 4 Netherlands

Professor of Computer Science Delft University of Technology



NAE
CONNECT TO INNOVATE

COMMIT/

nationale wetenschaps agenda

Commit 2 Data
connecting business and science

AITECH

# AI COALITION 4 NETHERLANDS AMBITIONS

**INCREASING RANGE**

## STRONG AI COMMUNITY REACHING RELEVANT STAKEHOLDERS

**ADDRESSING SOCIETAL ISSUES**

## ENGAGEMENT IN PUBLIC DEBATE TO DEVELOP AND IMPLEMENT AI RESPONSIBLY (FAIR TECH)

**SHAPING THE TRANSFORMATION**

## SUPPORTING SECTORAL TRANSITIONS WITH AI INDUSTRY AND APPLICATIONS

# AIC4NL ACTIVITIES

## AIC4NL LEARNING COMMUNITIES

### LOPENDE LEARNING COMMUNITIES

**MOMENTEEL ZIJN ER VIJF LEARNING COMMUNITIES GESELECTEERD DIE NAAR VERWACHTING IN FEBRUARI 2025 VAN START GAAN:**

- **CODING FOR CURE AND CARE:** VERBETERT DE ZORGREIS VAN PATIËNTEN DOOR MIDDEL VAN AI.
- **CARE FOR AI READINESS ACQUIRING INSIGHTS:** VERMINDERT ADMINISTRATIEVE LASTEN VOOR ZORGPROFESSIONALS MET AI.
- **AI LEARNING INITIATIVE FOR MULTI-MODAL TRAFFIC AND TRANSPORTATION:** VERHOOGT VERKEERSVEILIGHEID DOOR AI-TOEPASSINGEN.
- **MKB EN MBO VERZILVEREN DE KRACHT VAN AI:** RICHT ZICH OP HET VERBETEREN VAN PRODUCTKWALITEIT IN HET MKB MET AI.
- **AI VOOR EEN LERENDE MAAKINDUSTRIE:** STIMULEERT AI-TOEPASSINGEN BINNEN DE MAAKINDUSTRIE.

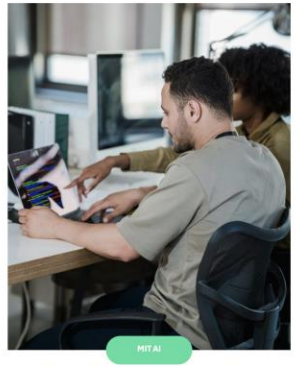
## AIC4NL FELLOW SHIP GRANTS

### LOPENDE FELLOW SHIP GRANDS

**IN MAART 2024 ZIJN VIJF BEURZEN TOEGEKEND AAN ONDERZOEKERS DIE ZICH RICHTEN OP UITEENLOPENDE AI-GERELATEERDE VRAAGSTUKKEN:**

- **DR. RIANNE FIJTEN, UNIVERSITEIT MAASTRICHT:** ONDERZOEKT DE INTEGRATIE VAN AI IN DE GEZONDHEIDSZORG, MET FOCUS OP VERTROUWEN, COMMUNICATIE EN ORGANISATORISCHE UITDAGINGEN.
- **DR. MADELON HULSEBOS, CENTRUM WISKUNDE & INFORMATICA:** ONTWIKKELT HET DATALIBRA-PROJECT OM INZICHTEN UIT GESTRUCTUREERDE DATA TOEGANKELIJK TE MAKEN VIA TABLE REPRESENTATION LEARNING.
- **DR. FILIP ILIEVSKI, VRIJE UNIVERSITEIT AMSTERDAM:** STREEFT NAAR DE ONTWIKKELING VAN MENSGERICHTE AI-SYSTEMEN MET GEZOND VERSTAND, INCLUSIEF MENTALE MODELLERING EN CULTUREEL GEÏNFORMEERD REDENEREN.
- **DR. KONRAD KOLLNIG, UNIVERSITEIT MAASTRICHT:** RICHT ZICH OP HET OVERBRUGGEN VAN DE KLOOF TUSSEN AI-REGELGEVING EN PRAKTISCHE IMPLEMENTATIE DOOR ONTWIKKELING VAN REGTECH-OPLOSSINGEN.
- **DR. AAQIB SAEED, TECHNISCHE UNIVERSITEIT EINDHOVEN:** ONTWIKKELT PRIVACYBESCHERMENDE AI VOOR HET MONITOREN VAN GEZONDHEID VIA AUDIO-ANALYSE VAN CONSUMENTEN DEVICES.

## AIC4NL MIT AI




### LOPENDE MIT AI PROJECTEN

**IN DE ZOMER VAN 2024 ZIJN VEERTIEN INNOVATIEVE INITIATIEVEN GESELECTEERD DIE BIJDRAGEN AAN MAATSCHAPPELIJKE EN SECTORALE VERNIEUWING:**

- KWALITEITSVOORSPELLING EN SIMULATIEOPTIMALISATIE VOOR GLASPRODUCTIE
- SAIFE
- AUTHENTICATOR
- REMOTE PREVISION OF SIDE-EFFECTS FROM IMMUNE EFFECTOR CELL (IEC) THERAPY
- SPACESILICON-AI
- WINDWATCHAI
- GEOAI PLATFORM FOR ACCESSIBLE AND AUTOMATED GEOSPATIAL INTELLIGENCE OPERATIONS
- GENERATIEVE AI VOOR PERI-OPERATIEVE PATIËNT MONITORING
- 2ND LIFE BATTERY: EFFICIËNT HERGEBRUIK VAN EV BATTERIJEN
- GEPERSONALISEERDE LEERPADEN
- JUVC 4
- PREDICTIVE SAFETY MANAGEMENT
- ONTWIKKELING REGULATORY AI SANDBOX VOOR DE GEZONDHEIDSZORG
- DISTRILOGIX

## AIC4NL ELSA LABS

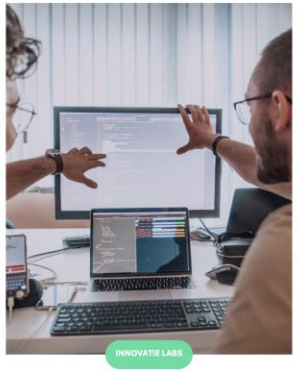
### LOPENDE ELSA LABS

- ELSA LAB DEFENCE
- ELSA LAB AI FOR MULTI-AGENCY PUBLIC
- ELSA LAB THE AI, MEDIA & DEMOCRACY LAB
- ELSA LAB AI FOR SUSTAINABLE FOOD SYSTEMS
- ELSA LAB NORTHERN NETHERLANDS
- ELSA LAB POVERTY & DEBT

START 4 NIEUWE ELSA LABS VOOR VERANTWOORDE AI-ONTWIKKELING MAART 2025:

- ELSA LAB FOR TECHNICAL INDUSTRY
- LEGAL, REGULATORY, AND POLICY ASPECTS OF CLINICAL DECISION SUPPORT SYSTEMS
- ELSA LAB AI FOR HEALTH EQUITY
- MOBILITY DESAIGN LAB

## AIC4NL INNOVATION LABS




### LOPENDE INNOVATIELABS

MOMENTEEL ZIJN ER VIER INNOVATIELABS GESELECTEERD, DIE NAAR VERWACHTING IN DE ZOMER VAN 2025 VAN START GAAN:

- PROSPER INNOVATIONLAB
- MARITIME AI INNOVATIONLAB
- LARGE LANGUAGE MODELS FOR LOGISTIC MANAGEMENT
- FLEXLAB AI INNOVATIELAB

## AI-FABRIEK

**PUBLIC-PRIVATE COLLABORATIONS € 350 MLN**

# AI INNOVATION FROM REGION TO EUROPE

**7 REGIONAL AI-HUBS**

**SECTORAL AND THEMATIC WORK AREAS**

**STRATEGIC PARTNERS ADRA / ALT-EDIC / EU AI FORUM**

# ANNUAL NATIONAL AI CONGRESS

# WHAT IS IMPORTANT IN AI TODAY?

# WHAT IS IMPORTANT … BUT NOT FOR TODAY

AIC4NL

## Artificial Narrow Intelligence (ANI)

AI that specializes in one area.

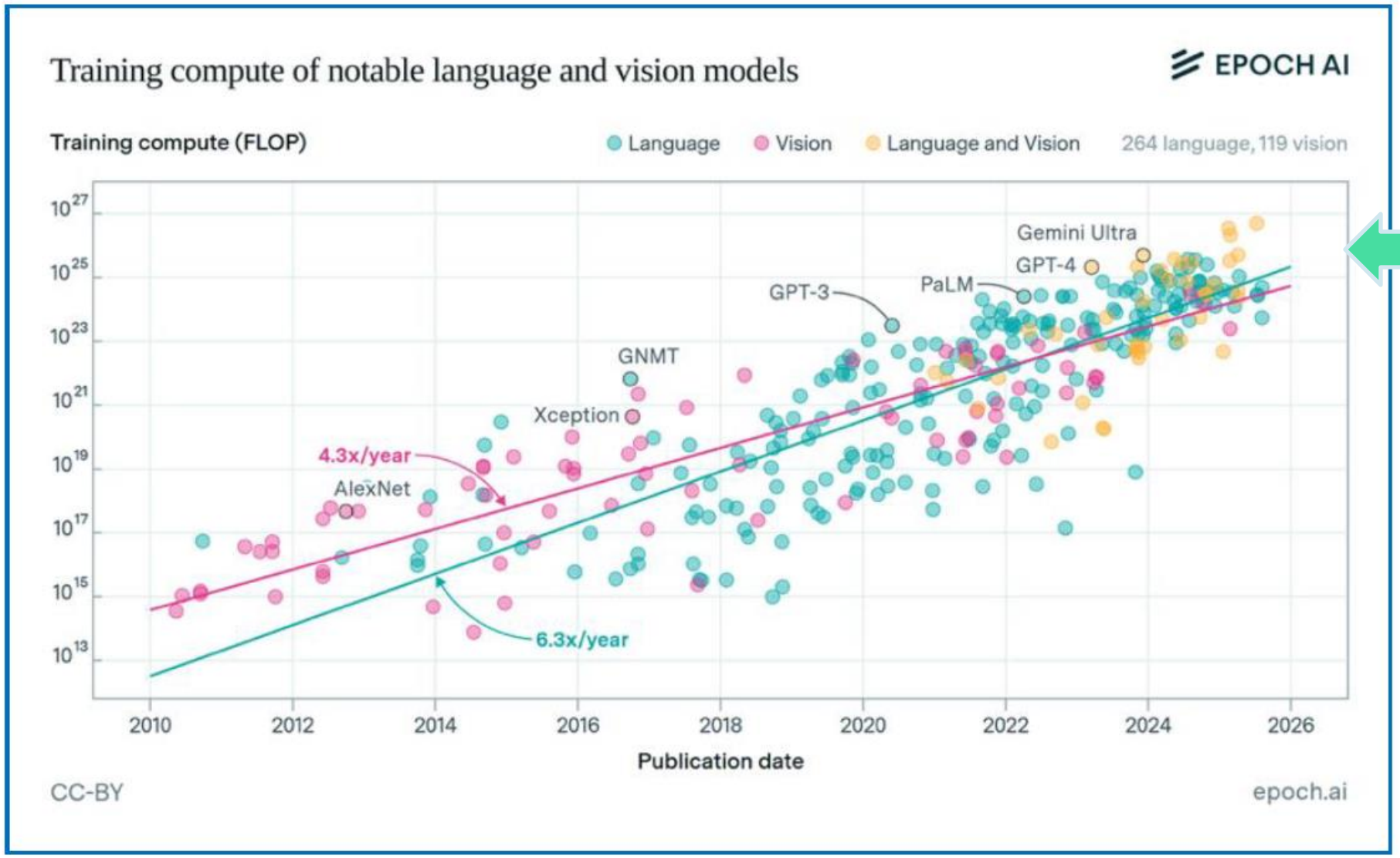
## Artificial General Intelligence (AGI)

Or Strong AI, refers to a computer that can perform any intellectual task that a human being can.

## Artificial SuperIntelligence (ASI)

"an intellect that is much smarter than the best human brains in practically every field, including scientific creativity, general wisdom and social skills."

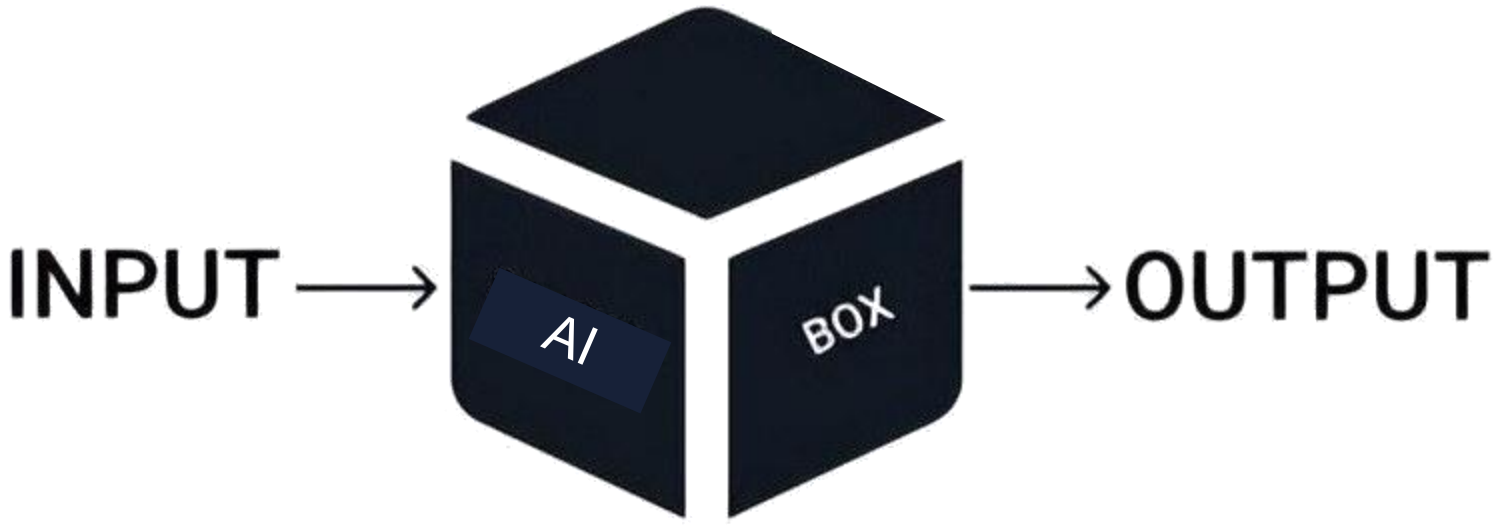
# DATA AND COMPUTING SATURATION POINT?




$10^{26}$: AI GIGAFACTORY WITH 100.000 GPUS RUNS FOR 6 MONTHS CONTINUOUSLY

deepseek

# WHAT IS IMPORTANT ... TODAY .. THE WHY



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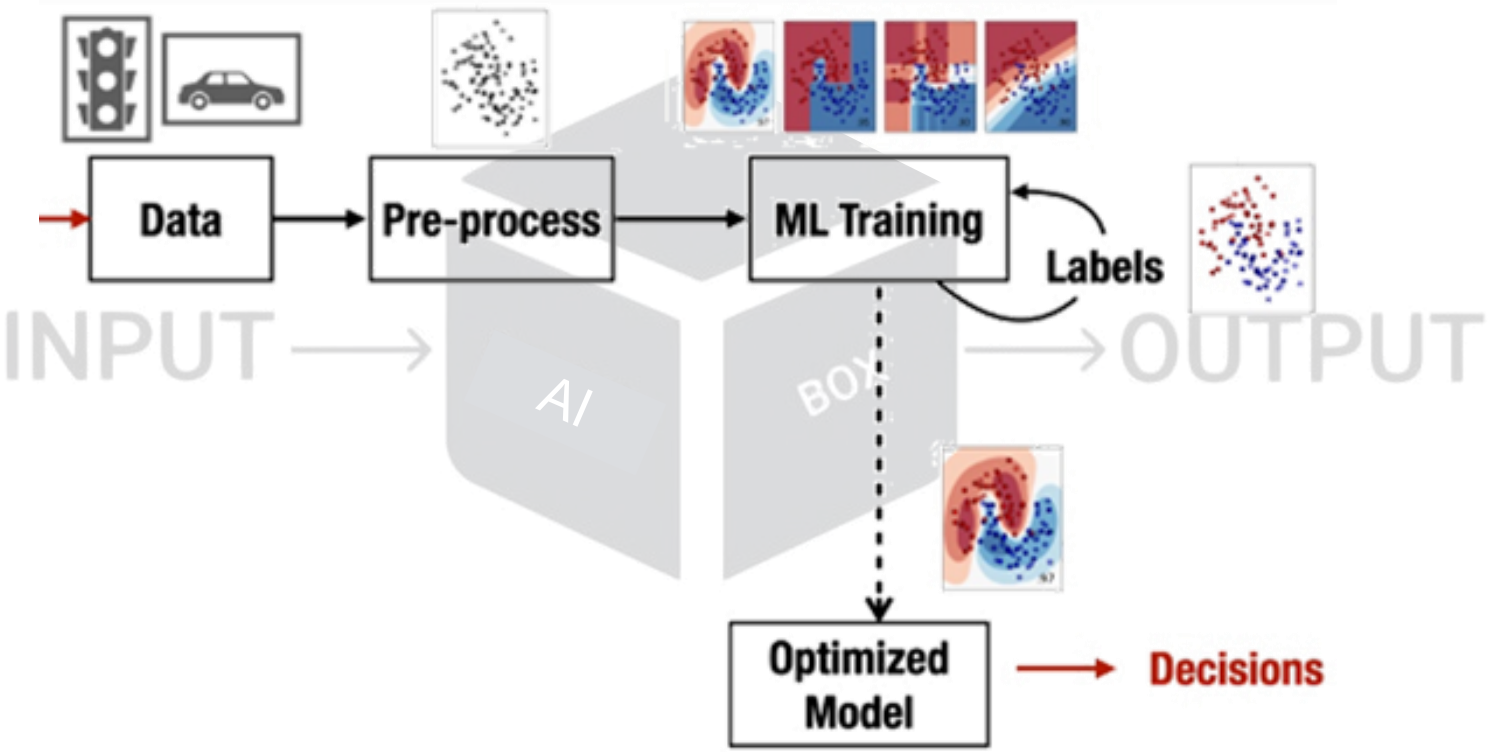

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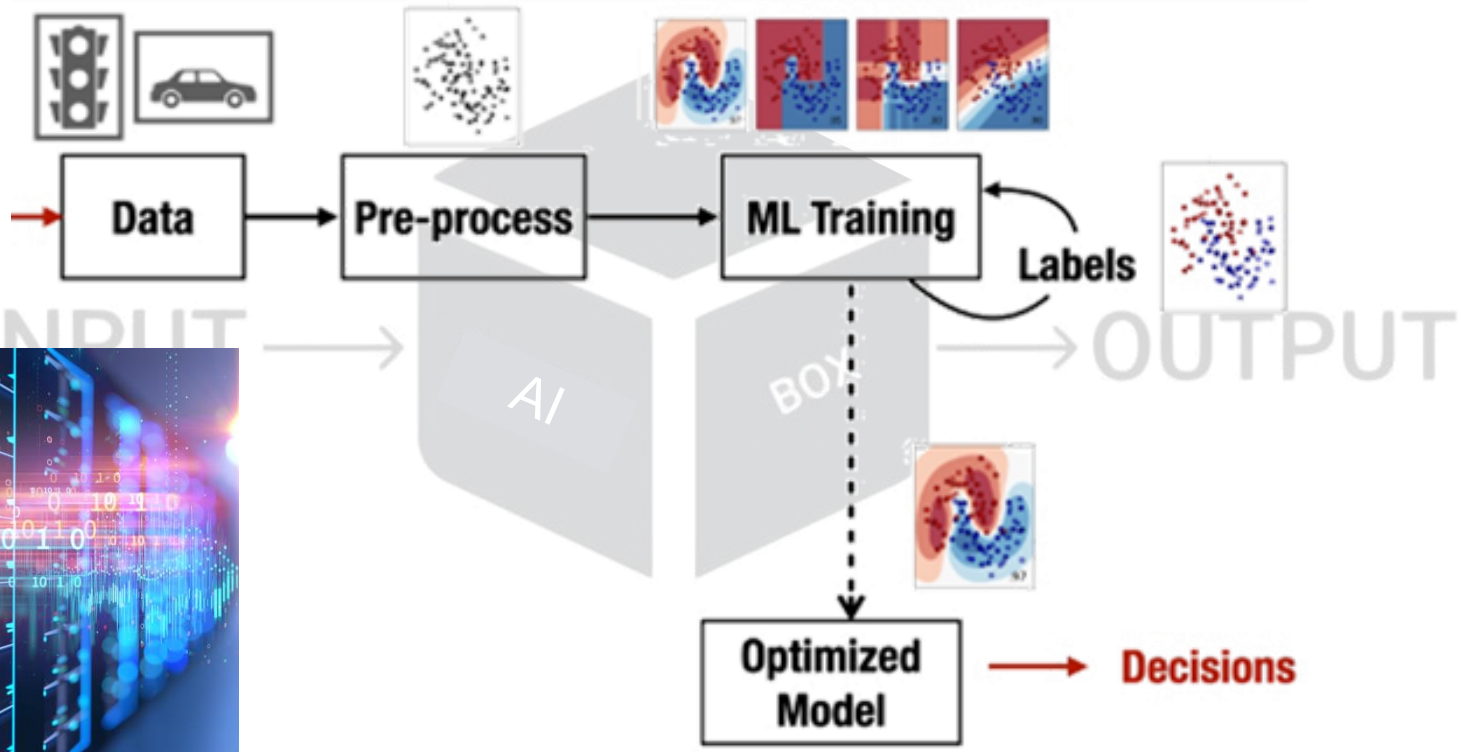

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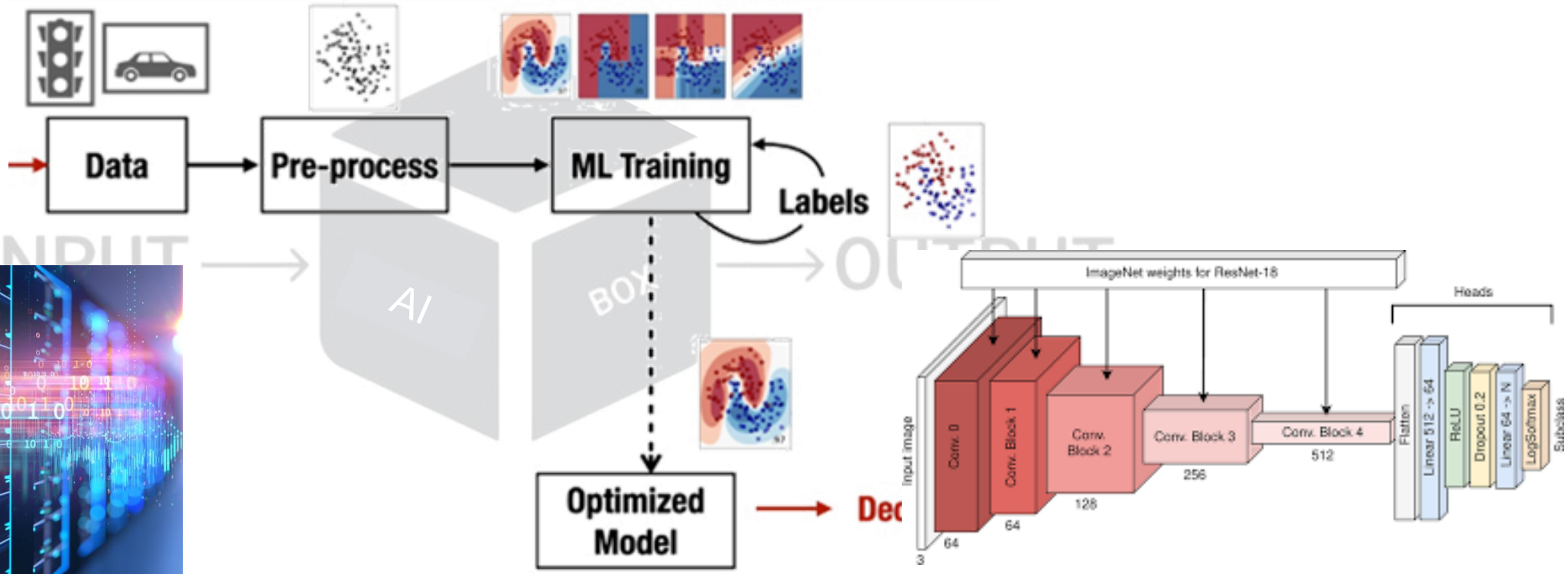

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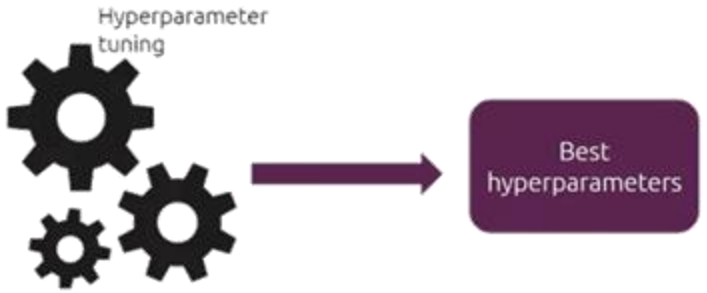


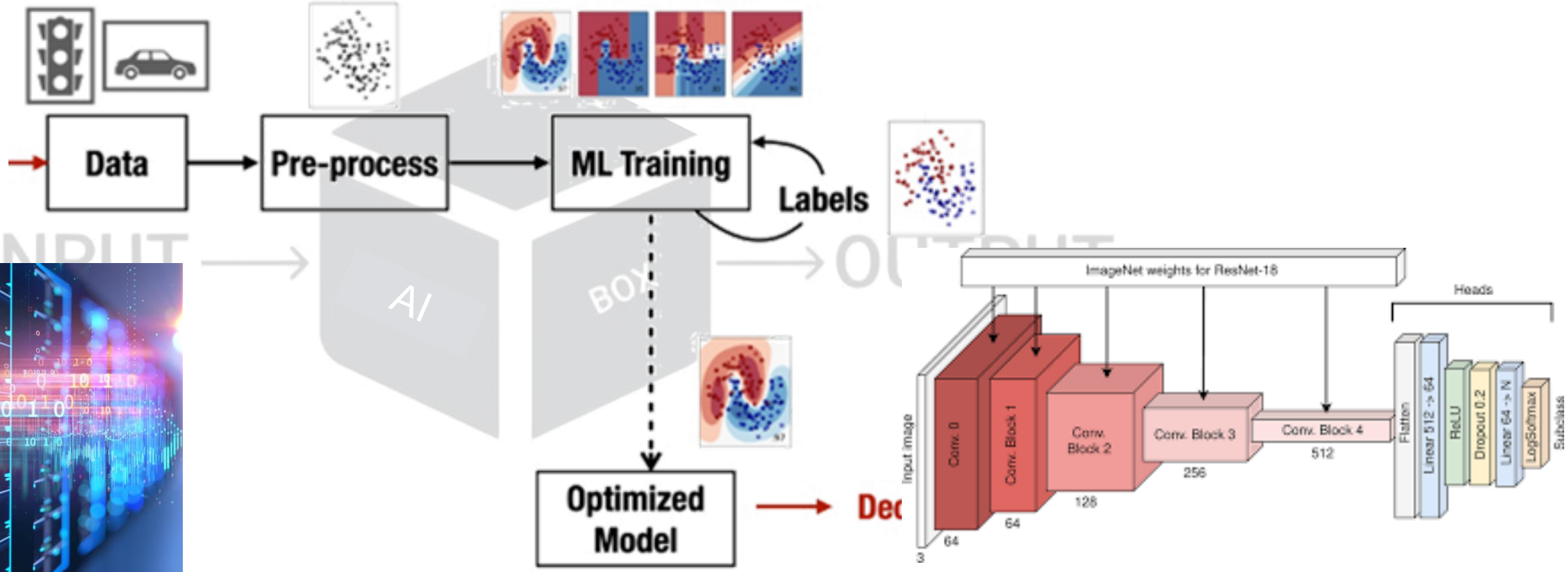

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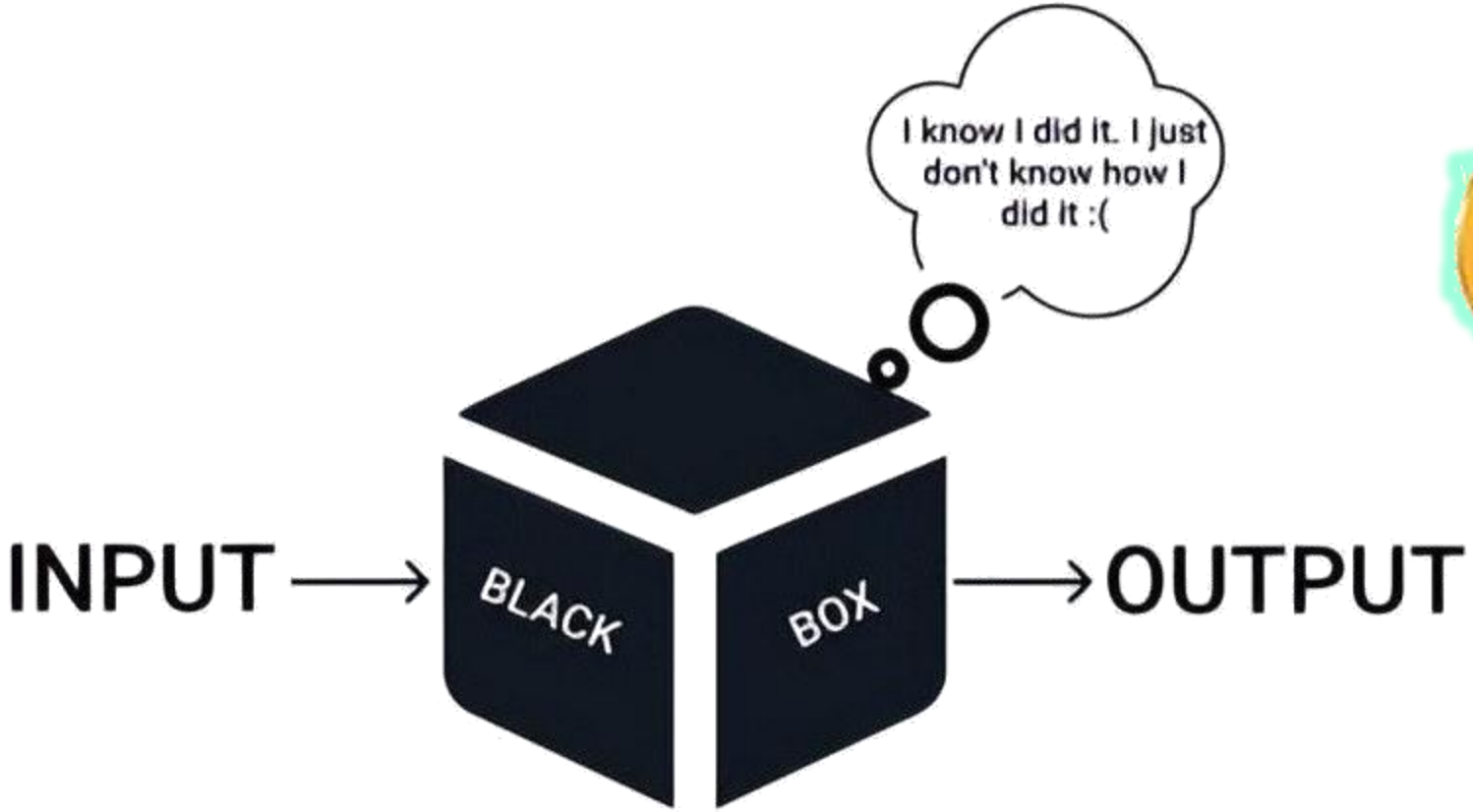

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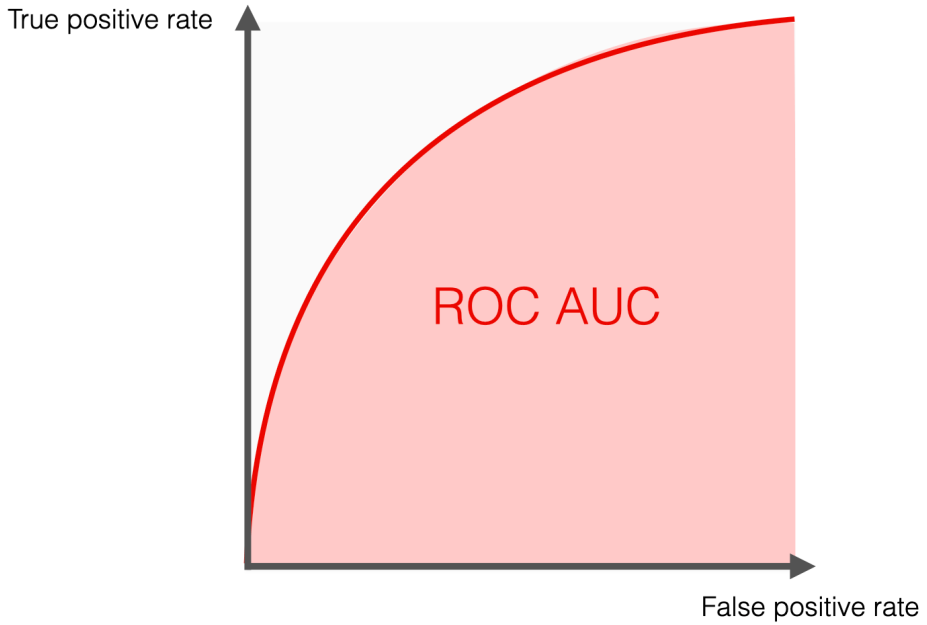


**TRAINING: LARGER AUC >> BETTER PERFORMANCE FOR SURE!**

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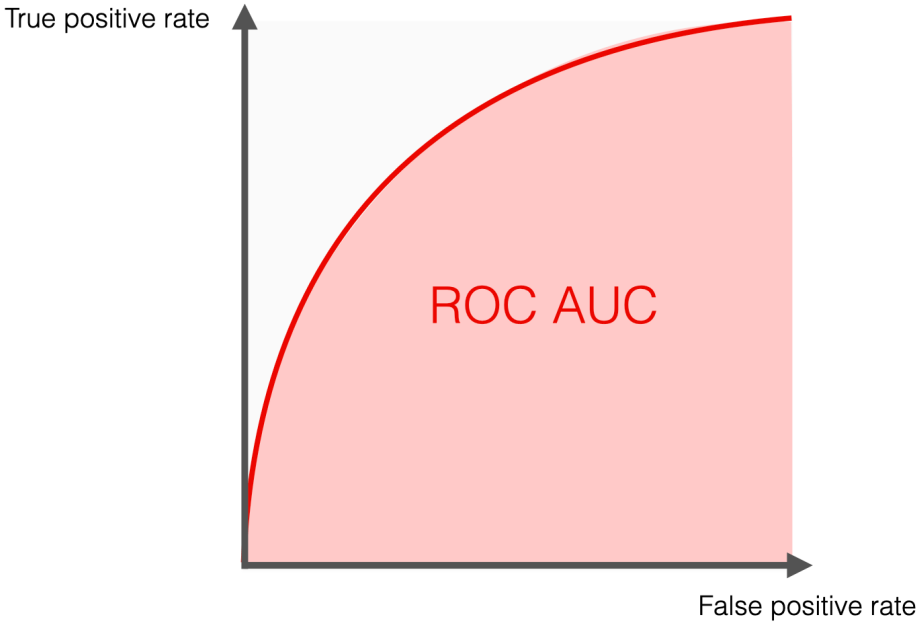


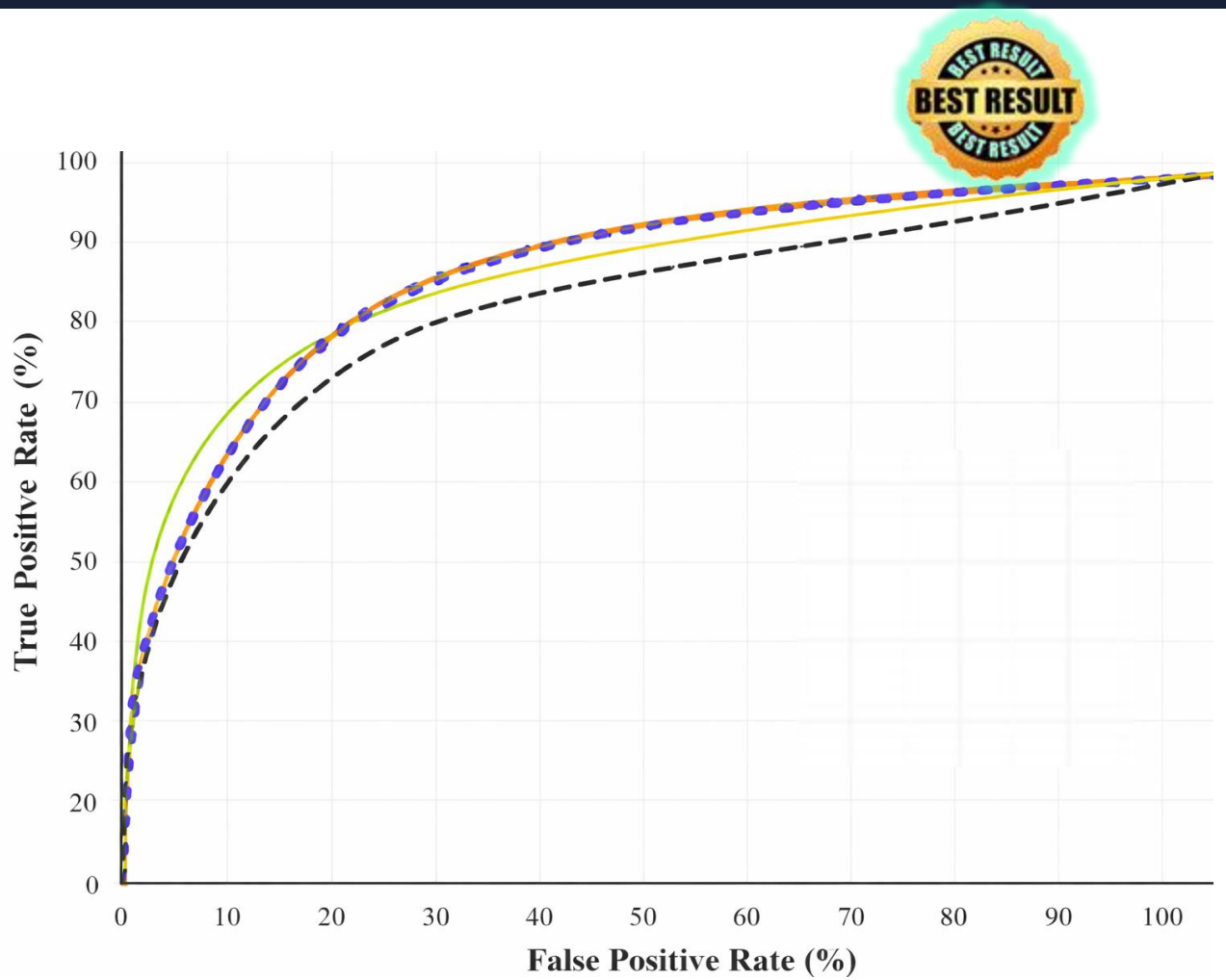


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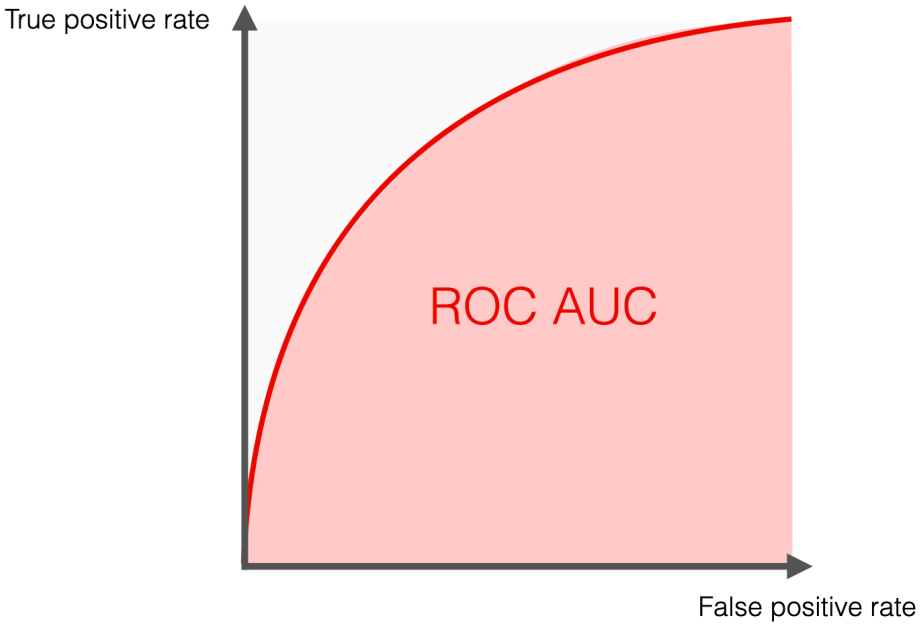
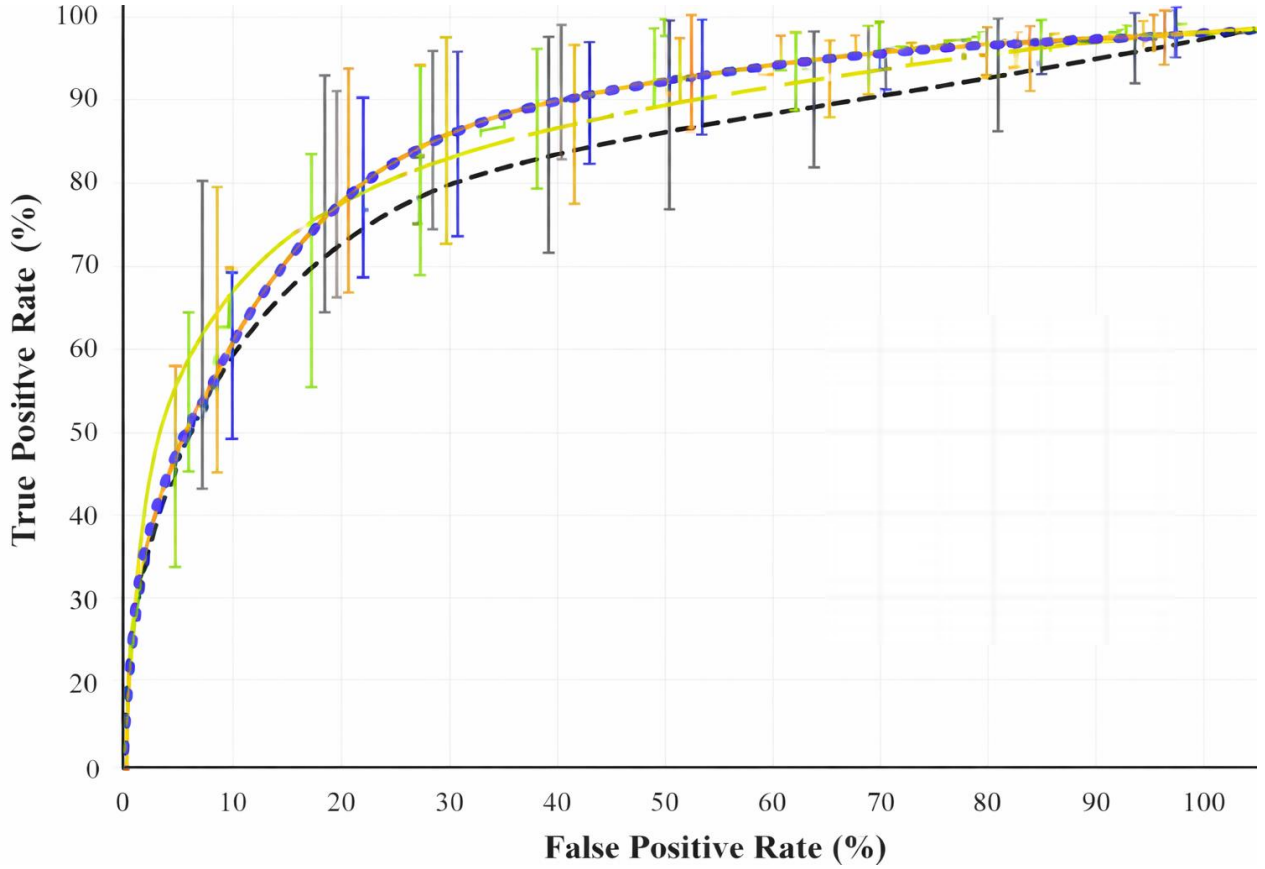
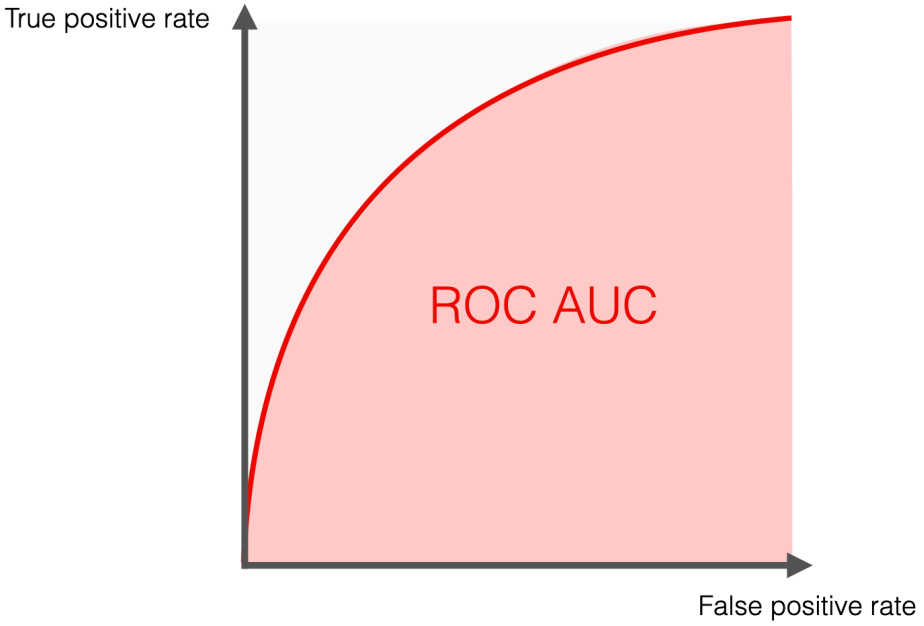


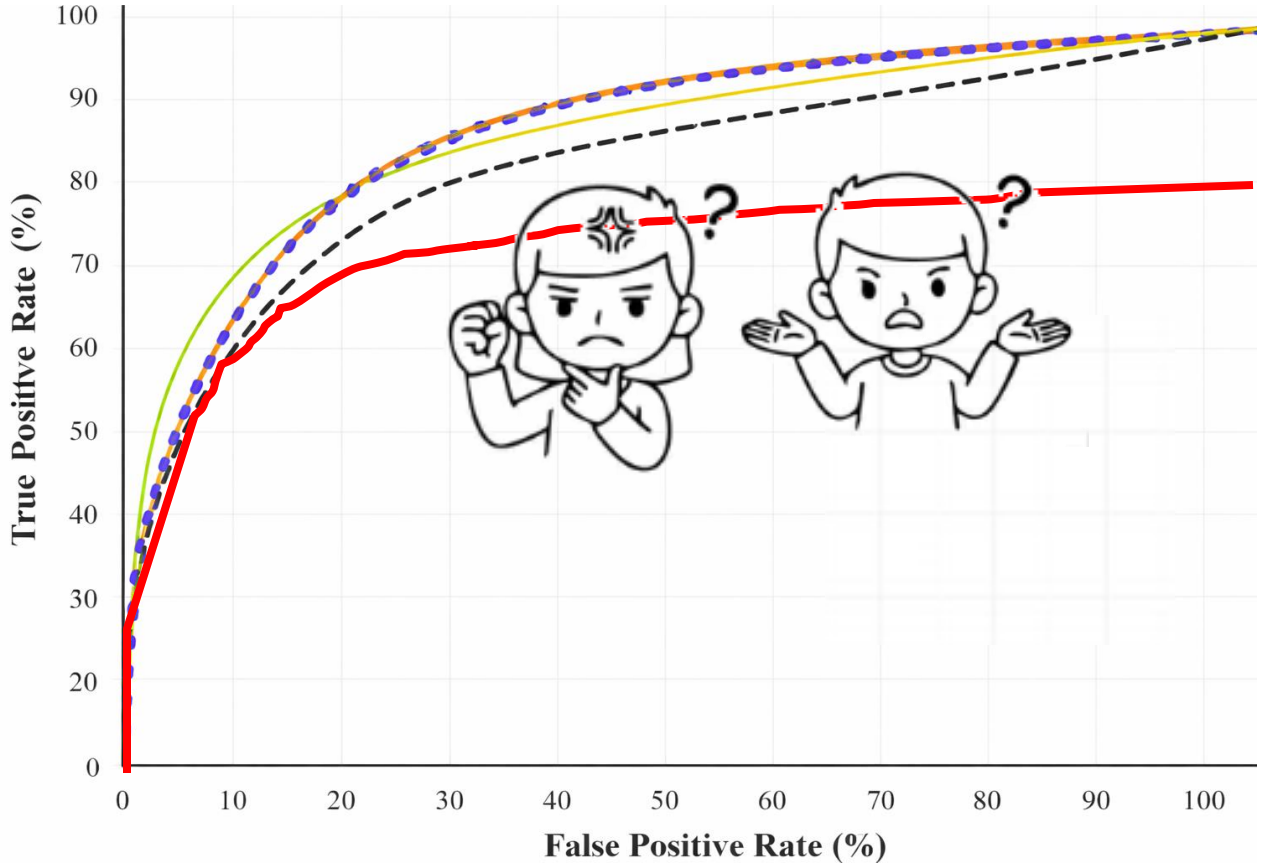




## TRAINING: LARGER AUC >> STATISTICALLY SIGNIFICANT?

## IS MODEL PERFORMING REALLY BETTER?

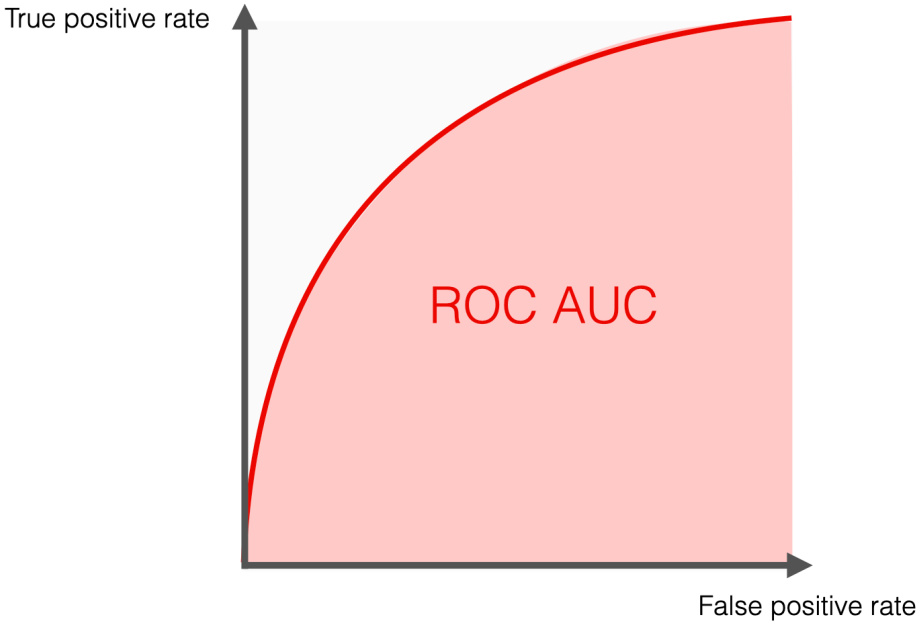
# WHAT IS IMPORTANT … BUT NEGLECTED

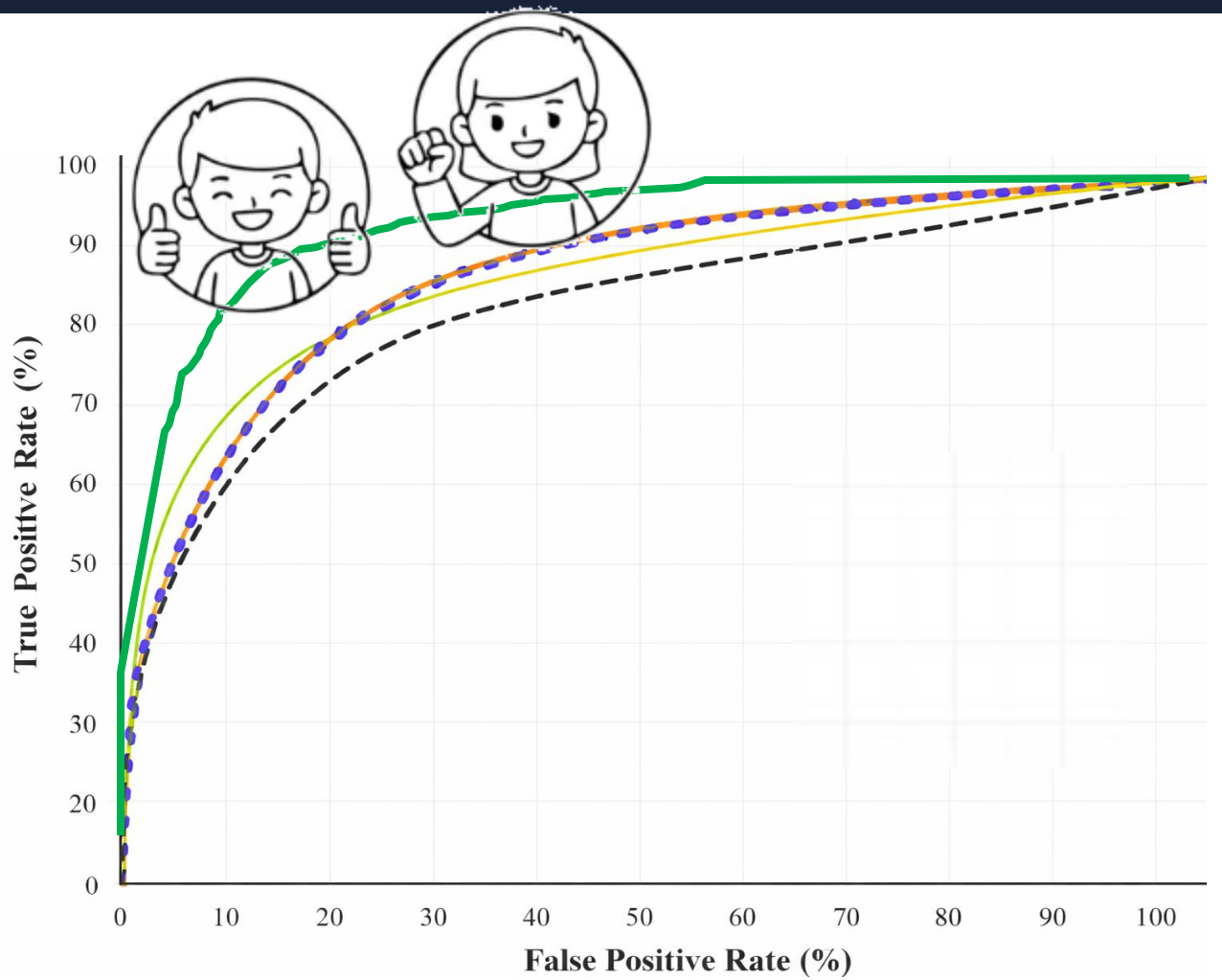



## TRAINING: RESULT OF ANOTHER HYPERPARAMETER OPTIMIZATION
## WHAT IS YOUR REACTION?

# WHAT IS IMPORTANT … BUT NEGLECTED




## TRAINING: WHY DO WE ONLY SEEK TO EXPLAIN THE POORER AND NOT THE BETTER PERFORMANCE? (ABLATION STUDIES ARE A MUST)

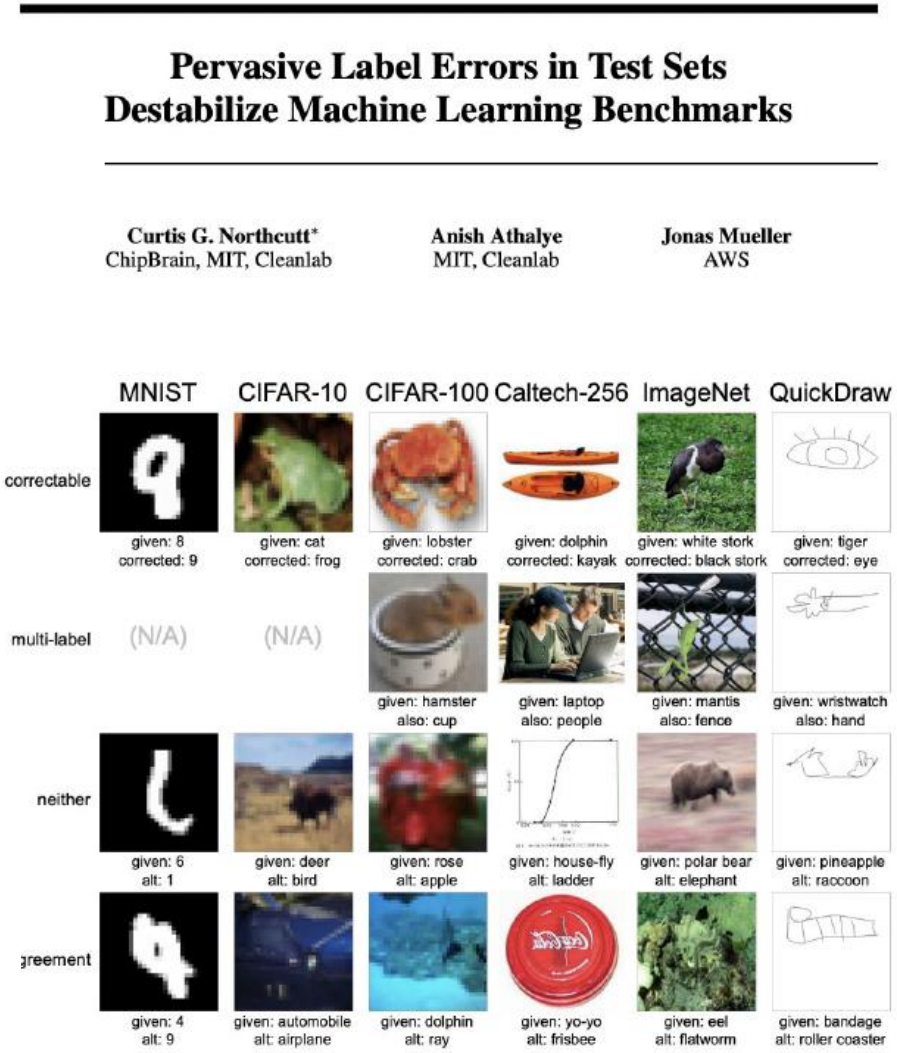
# WHAT ARE WE OPTIMIZING FOR?

## LABEL NOISE

- Many datasets have significant levels of label noise (around 3%)
  - Especially crowdsourced ones, e.g. ImageNet (6%)
- Correcting labels leads to simpler models that generalise better
  - Reducing label noise by only 6% makes ResNet-18 outperform ResNet-50 on ImageNet

**Be aware of the quality of data and labels in 'hyper-optimizing' the model.**

**What is the appropriate complexity of the model, given the quality and amount of data and labels?**



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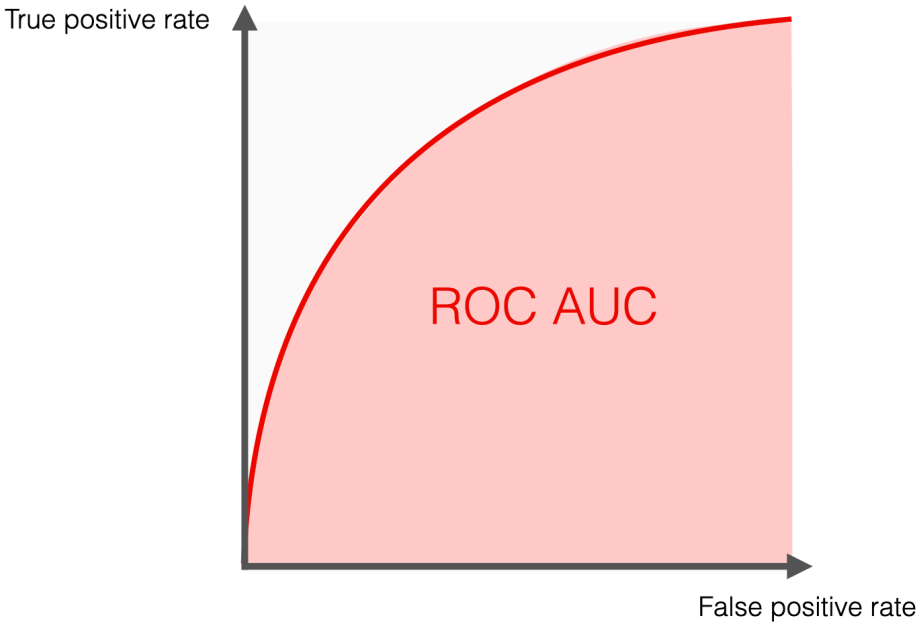


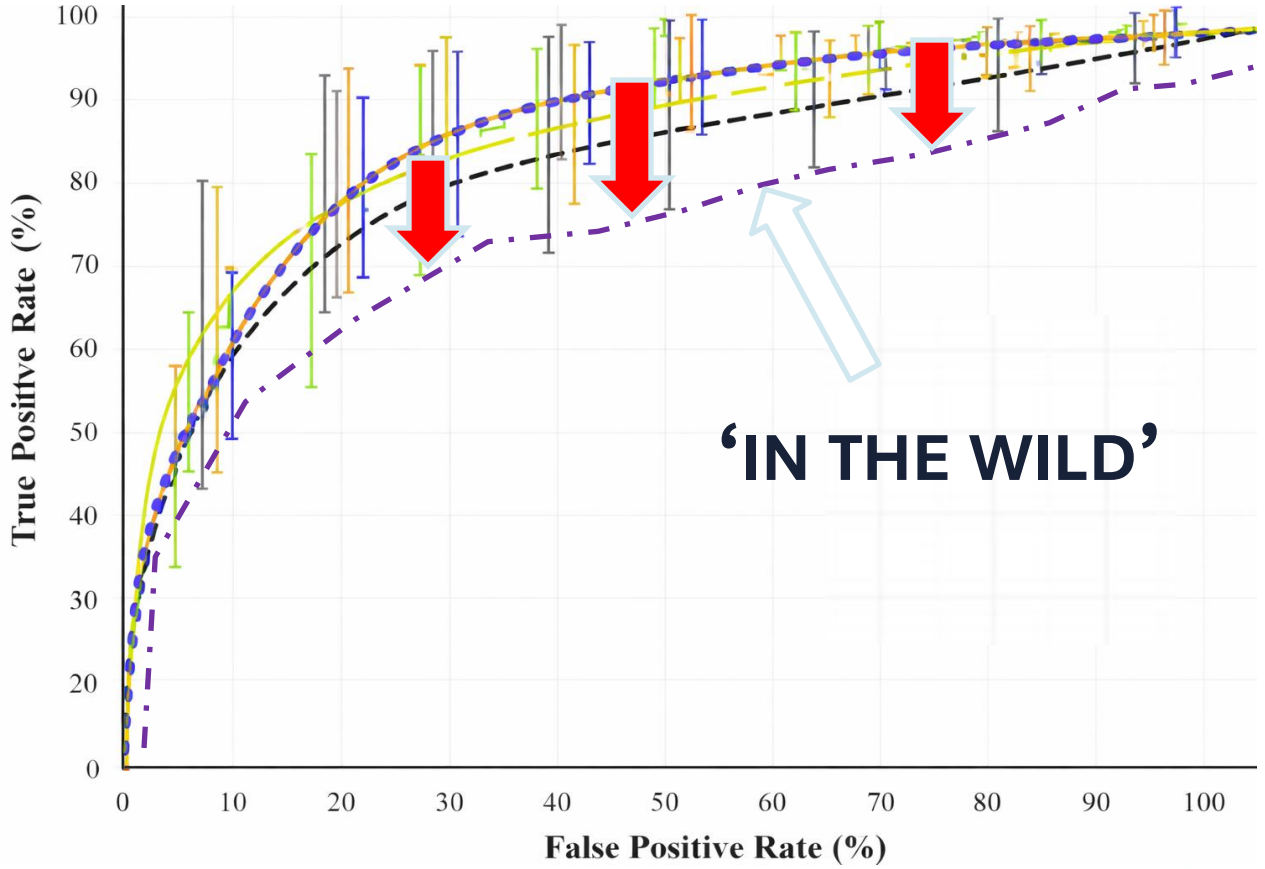


## DEPLOYMENT OF IN THE WILD: LESS CONTROL OVER DATA, STILL ? (GENERALIZABILITY AND RESILIENCE OF THE MODEL TO DATA QUALITY)

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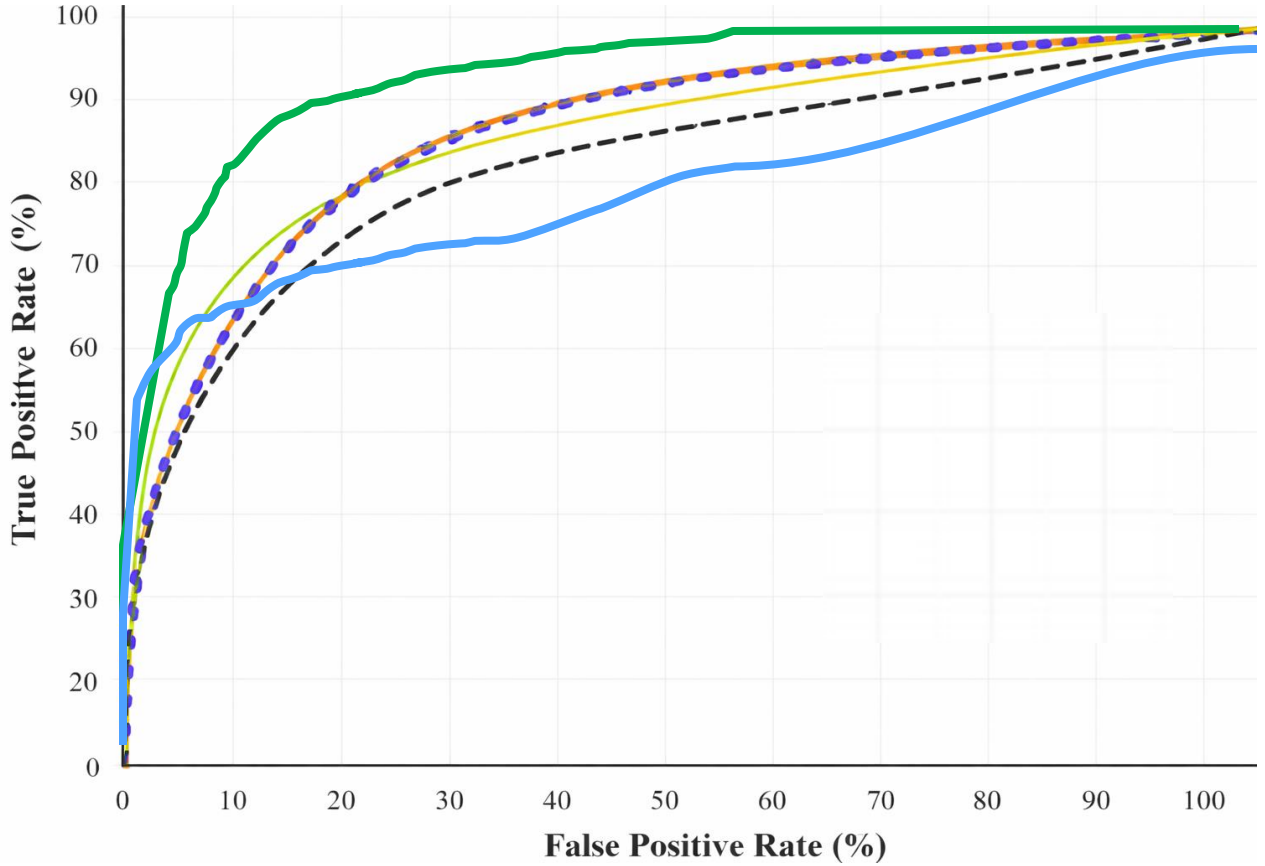
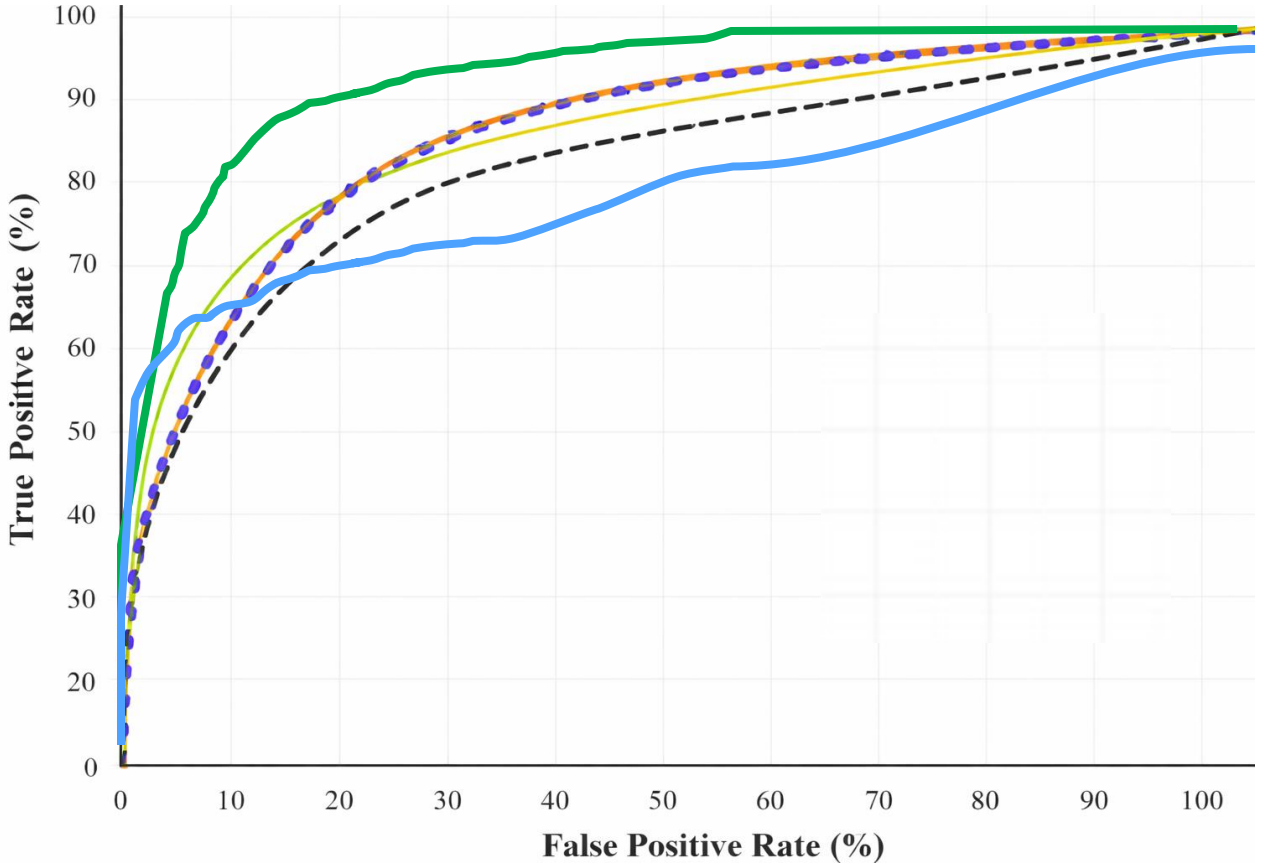



## TRAINING: DECIDE ON AUC?

# WHAT IS IMPORTANT … BUT NEGLECTED

**CASE 1: DISTINGUISH APPLES FROM PEARS**

**CASE 2: PASSPORT CONTROL BY E-GATES AT THE AIRPORT**




**TRAINING: DECIDE ON AUC?**

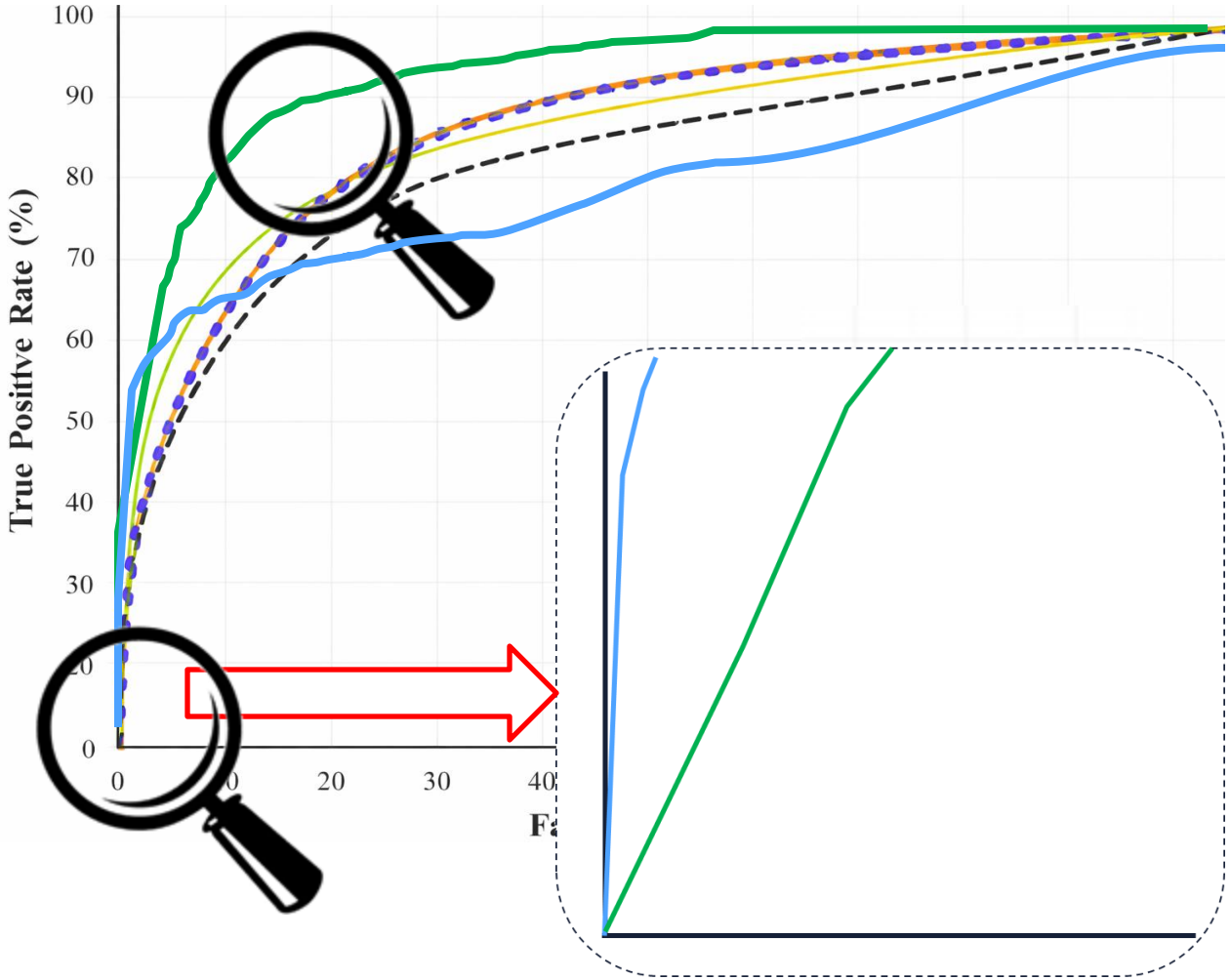
# WHAT IS IMPORTANT … BUT NEGLECTED

**CASE 1: DISTINGUISH APPLES FROM PEARS**

FPR ~ 0,2
TPR ~ 0,9

**CASE 2: PASSPORT CONTROL BY E-GATES AT THE AIRPORT**

FPR < $10^{-6}$
TPR ~ 0,8



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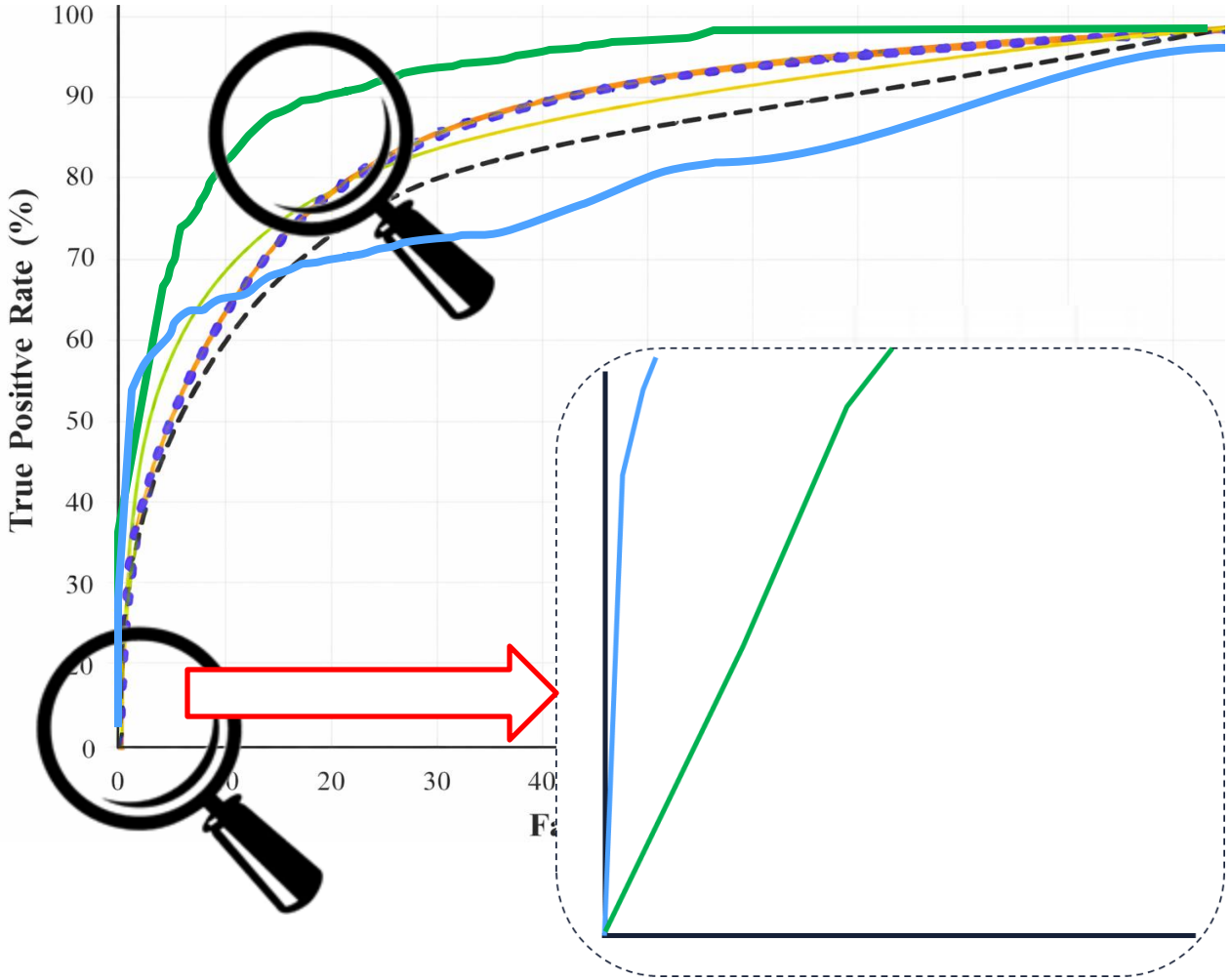



**DEPLOYMENT: WHICH PART OF ROC IS RELEVANT? WHAT ARE CONSEQUENCES?**

# FIXING THINGS AFTERWARDS (IF …)

GOOGLE

Google Photos Mistakenly Labels Black People 'Gorillas'

BY CONOR DOUGHERTY JULY 1, 2015 7:01 PM 42

Email

Google continued to apologize Wednesday for a flaw in Google Photos, which was released to great fanfare in May, that led the new application to mistakenly label photos of black people as "gorillas."

WIRED SECURITY POLITICS GEAR THE BIG STORY MORE SUBSCRIBE

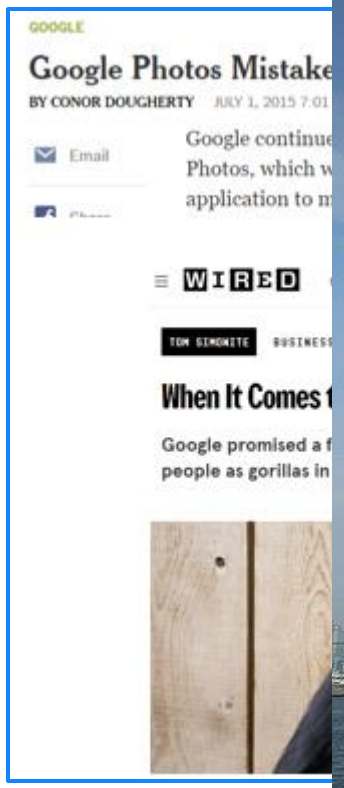
TOM SIMONITE BUSINESS JAN 11, 2018 7:00 AM

When It Comes to Gorillas, Google Photos Remains Blind

Google promised a fix after its photo-categorization software labeled black people as gorillas in 2015. More than two years later, it hasn't found one.

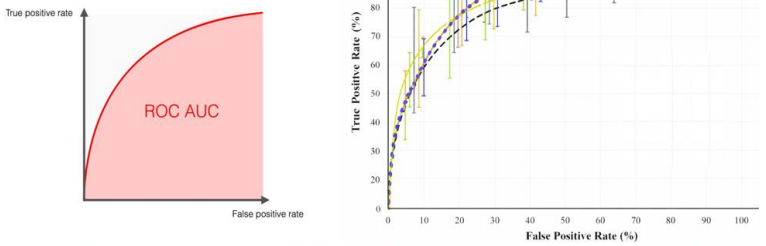
## FIXING UNDESIRED BEHAVIOR; OR UNDERSTAND AND DESIGN PROPERLY?

# FIXING THINGS AFTERWARDS (IF …)



**WOULD WE ACCEPT ‘FIXING THINGS’ WHEN DESIGNING A BRIDGE?**

## WHAT IS IMPORTANT … BUT NEGLECTED







TRAINING: LARGER AUC >> STATISTICALLY SIGNIFICANT?
IS MODEL PERFORMING REALLY BETTER?

## WHAT IS IMPORTANT … BUT NEGLECTED

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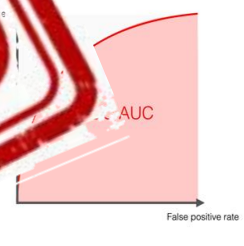
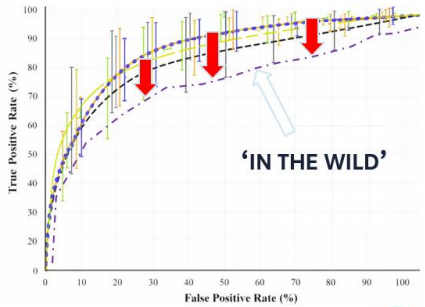
## …AT IS IMPORTANT … BUT NEGLECTED




DEPLOYMENT OF IN THE WILD: LESS CONTROL OVER DATA, STILL …?
(GENERALIZABILITY AND RESILIENCE OF THE MODEL TO DATA QUALITY)

22

## WHAT IS …

CASE 1: D… …SH A… …F…
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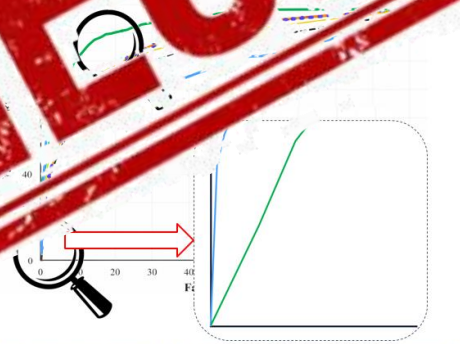

DEPLOYMENT: WHICH PART OF ROC IS RELEVANT? WHAT ARE CONSEQUENCES?

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## …THINGS AFTERWARDS (IF …)

WOULD WE ACCEPT 'FIXING THINGS' WHEN DESIGNING A BRIDGE?

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NEGLECTED

# WHAT IS IMPORTANT IN AI TODAY?

- Ask yourself the WHY-question as often as possible.
  - Why is the AUC, F1, FPR, … the appropriate performance criterion?
  - Why is model A performing better (or worse) than model B?
  - Why do you think performance is getting structurally better (and not a statistical fluke)?
  - Why does the model need to be so complex?
  - Why does the model generalize well (or not)?
  - Why did I not do an extensive ablation study?
  - Why did I use standard training and evaluation sets?
  - Why did I not factor-in the application context and consequences when optimizing the model?

  - Why are we not asking the why-question more often?

# I WISH YOU AN EXCITING AI-CUP CHALLENGE

# AND A LOT OF WHY'S