

MSE in Data Science at CAI of ZHAW

Machine Perception and Cognition Group

Application of Marco Betschart

36 years old

Software Developer since 2004

Climbing is a hobby of mine

Live in Zurich, grown up in Schlatt (TG)



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Floppy Disk configured as A: drive
Done processing startup files C:\FDCONFIG.SYS and C:\FDAUTO.BAT

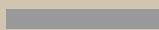
Type HELP to get support on commands and navigation.
Welcome to the MS-DOS operation system

C:\>

```
Floppy Disk configured as A: drive  
Done processing startup files C:\FDCONFIG.SYS and C:\FDAUTO.BAT
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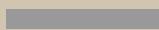
```
C:\> asjdf  
asjdf: Command not found  
C:\>
```



```
Floppy Disk configured as A: drive  
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```

```
Type HELP to get support on commands and navigation.  
Welcome to the MS-DOS operation system
```

```
C:\> asjdf  
asjdf: Command not found  
C:\> start-apprenticeship.bat  
Starting with Web Development in 2004...
```



Programming Languages

Java, Kotlin, Swift, Python, PHP, JavaScript+HTML+CSS, ...

Platforms

Spring Boot, Docker, WordPress, Android, iOS, ...

Infrastructure

Services

Web, Mail, DNS, Databases, ...

Operating Systems

Linux, Windows Server, macOS, iOS, Android



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Machine Learning and Data Mining

Artificial Intelligence 1+2

Visual Computing 1+2

Top grade in Bachelor Thesis

"XR as a tool in the selection process
of task force candidates"



"Connecting and digitalizing the precious metal industry"

Distributed platform with standardized taxonomy
for precious metal industry data



Recognize Values

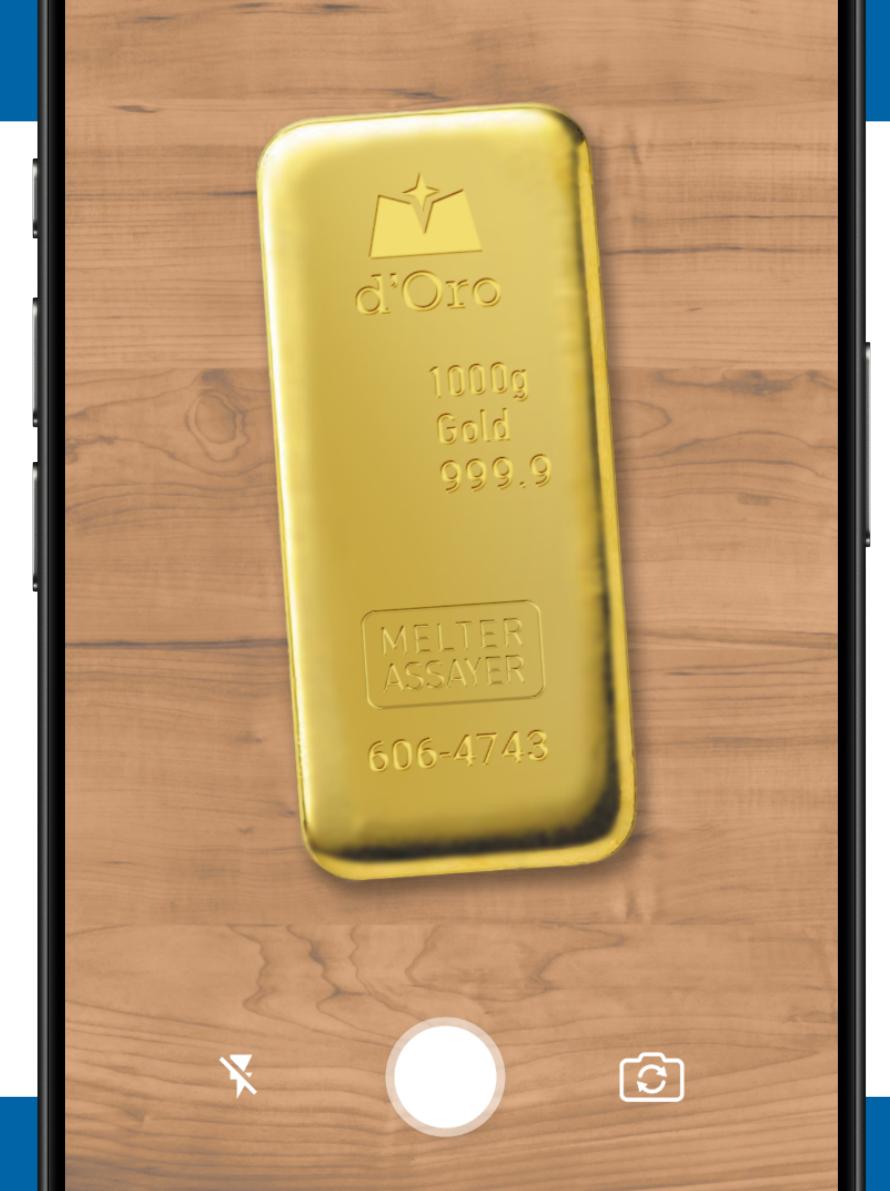
Brand, Format, Metal, Fineness, Serial Number

Supervised Learning

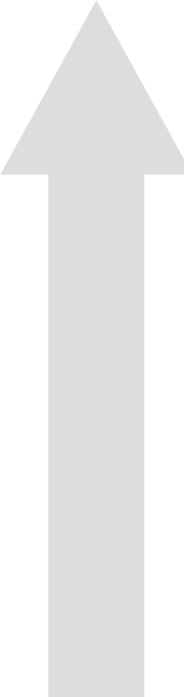
5000 images with their labels

Challenges

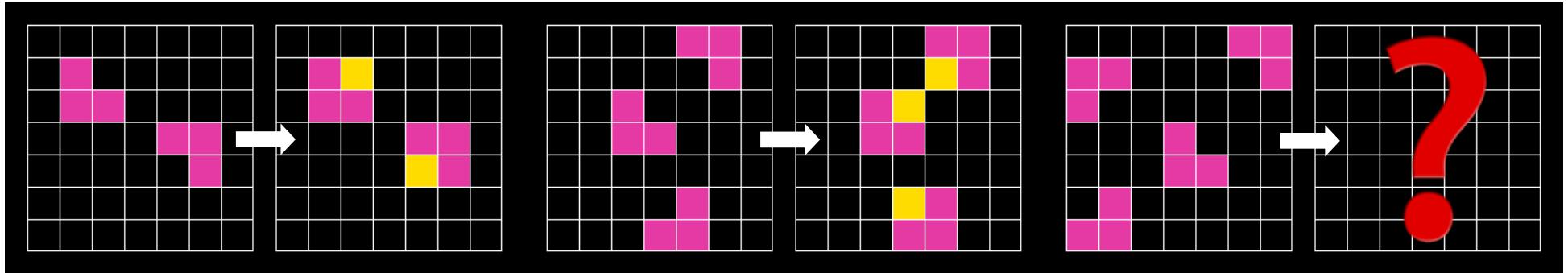
Hardware, Connectivity, Exotic Bullions,
Cost Efficiency



Industry
AI Competence Center
aXedras AG



Research
Next-Level AI
CAI at ZHAW



Engineered with core knowledge priors in mind

Model must be capable to solve novel challenges (secret evaluation set)

Method

Regression, SVM, Search + DSL, CNNs,
Transformers,

Tools

Tensor Flow, PyTorch, Numpy, ...

Existing Solutions

What did work? What didn't?

Constraints

Resources, Runtime, Network

Method → Biggest Unknown

Tools

~~Tensor Flow, PyTorch, Numpy, ...~~

Existing Solutions
CNN seems to be promising

Constraints

~~Resources, Runtime, Network~~

Neural-guided Program Search, 2021

A Path Towards Autonomous ML, 2022

Principles of Parsimony, 2022

Attention Is All You Need, 2023

KAN: Kolmogorov-Arnold Networks, 2024

1-bit LLMs, 2024

...

Alpha Signal

Data Machina

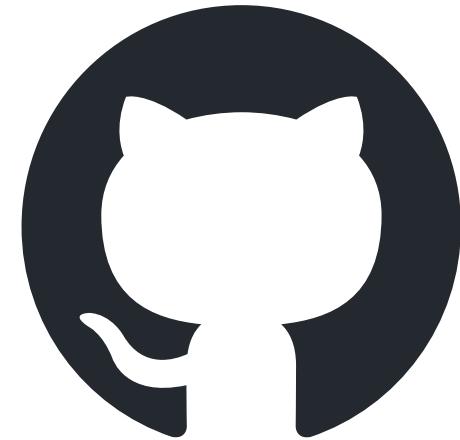
The Batch

Establish Test Baseline

Using a simple LinearModel

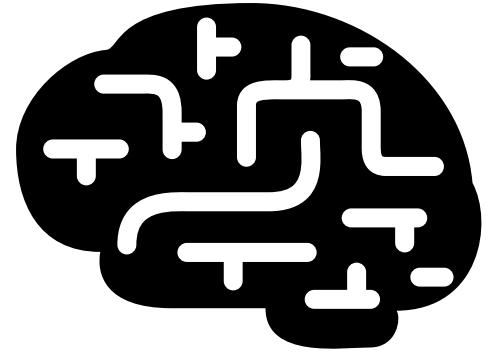
Build Environment for Experiments

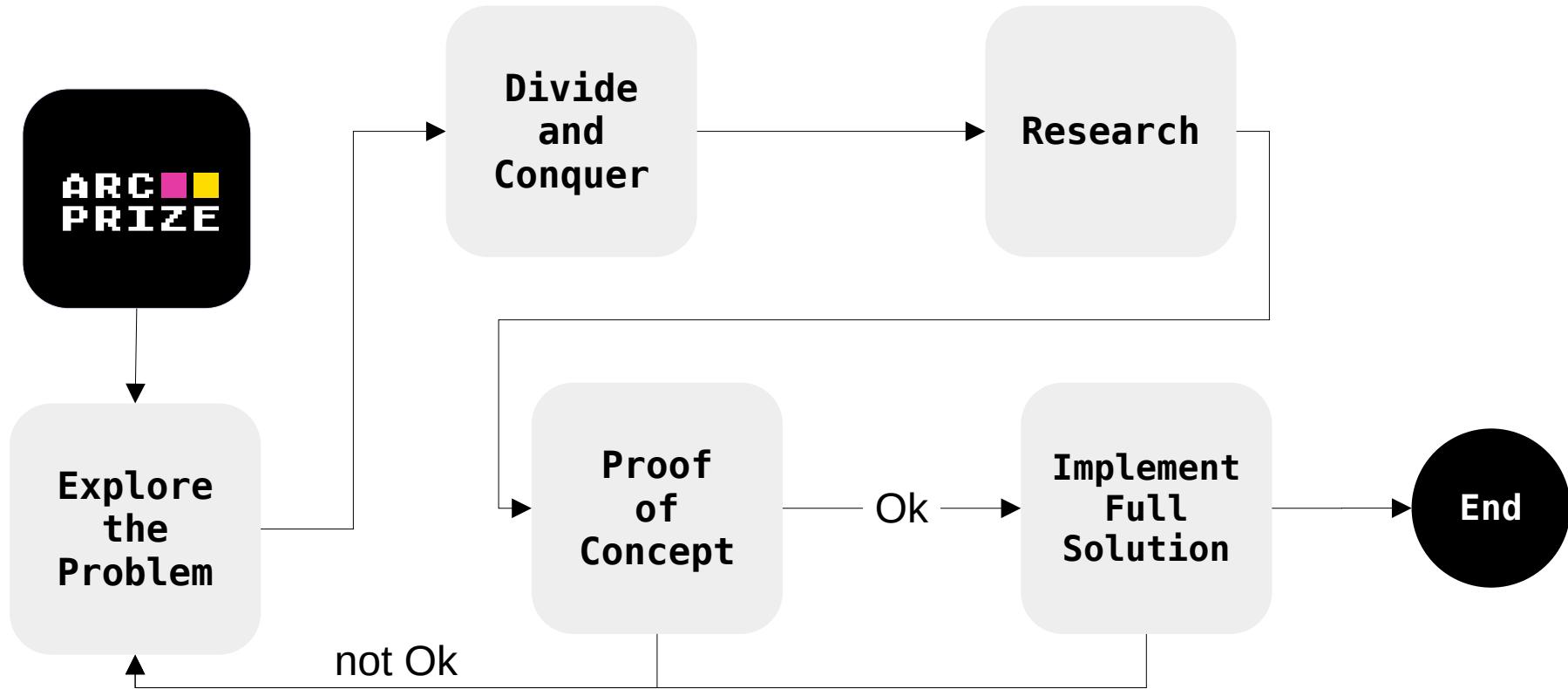
We want to run different experiments quickly



Neuroscience

Nature solved the problem already!





Questions?