

# Gait Recognition applying Incremental Learning

International Workshop on Human Identification at a Distance

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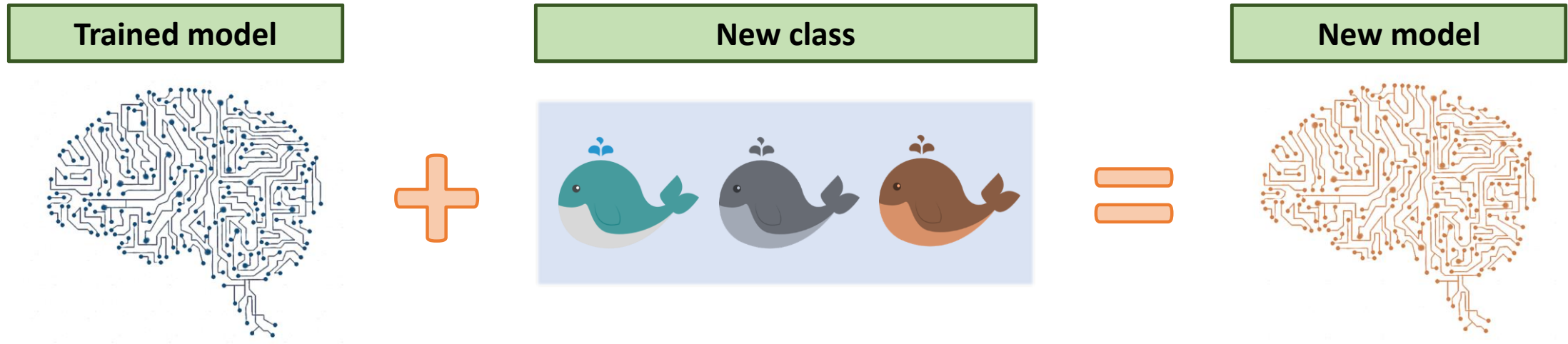


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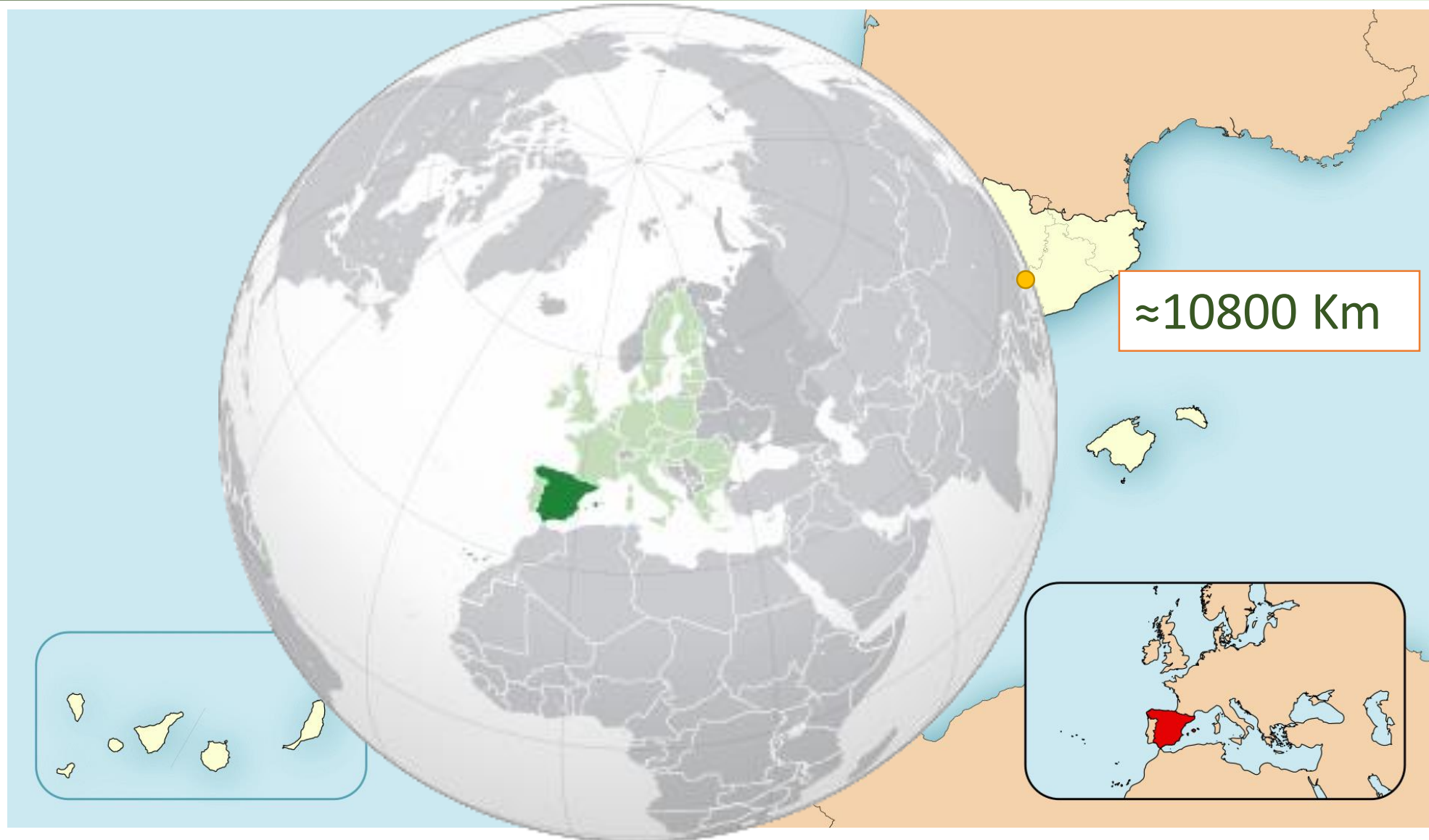
# Motivation

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**Without training from scratch!**

# Introduction



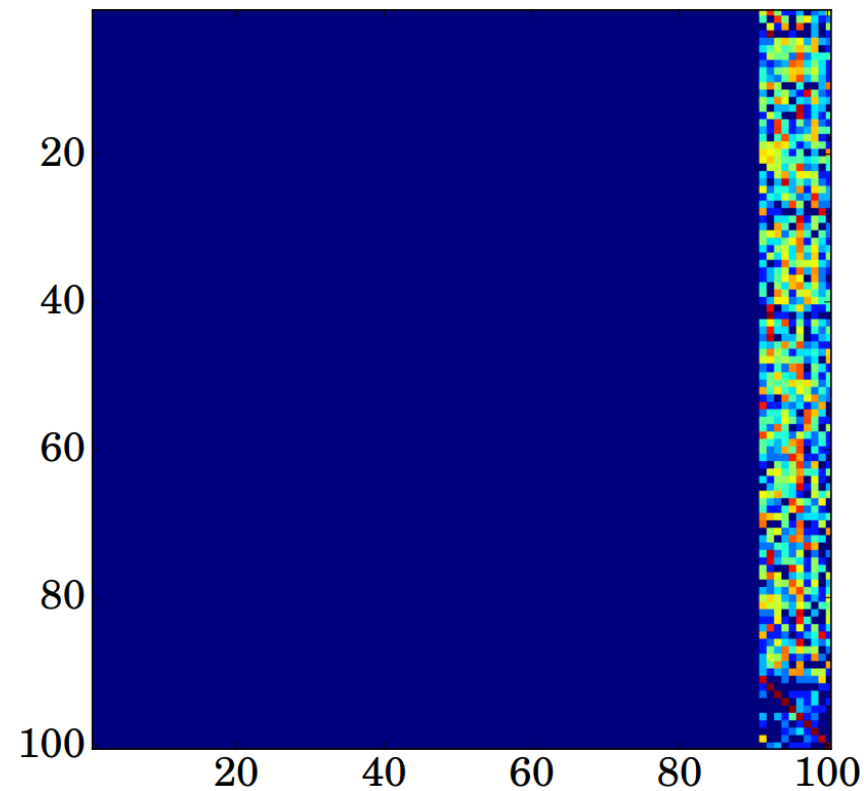
# Introduction



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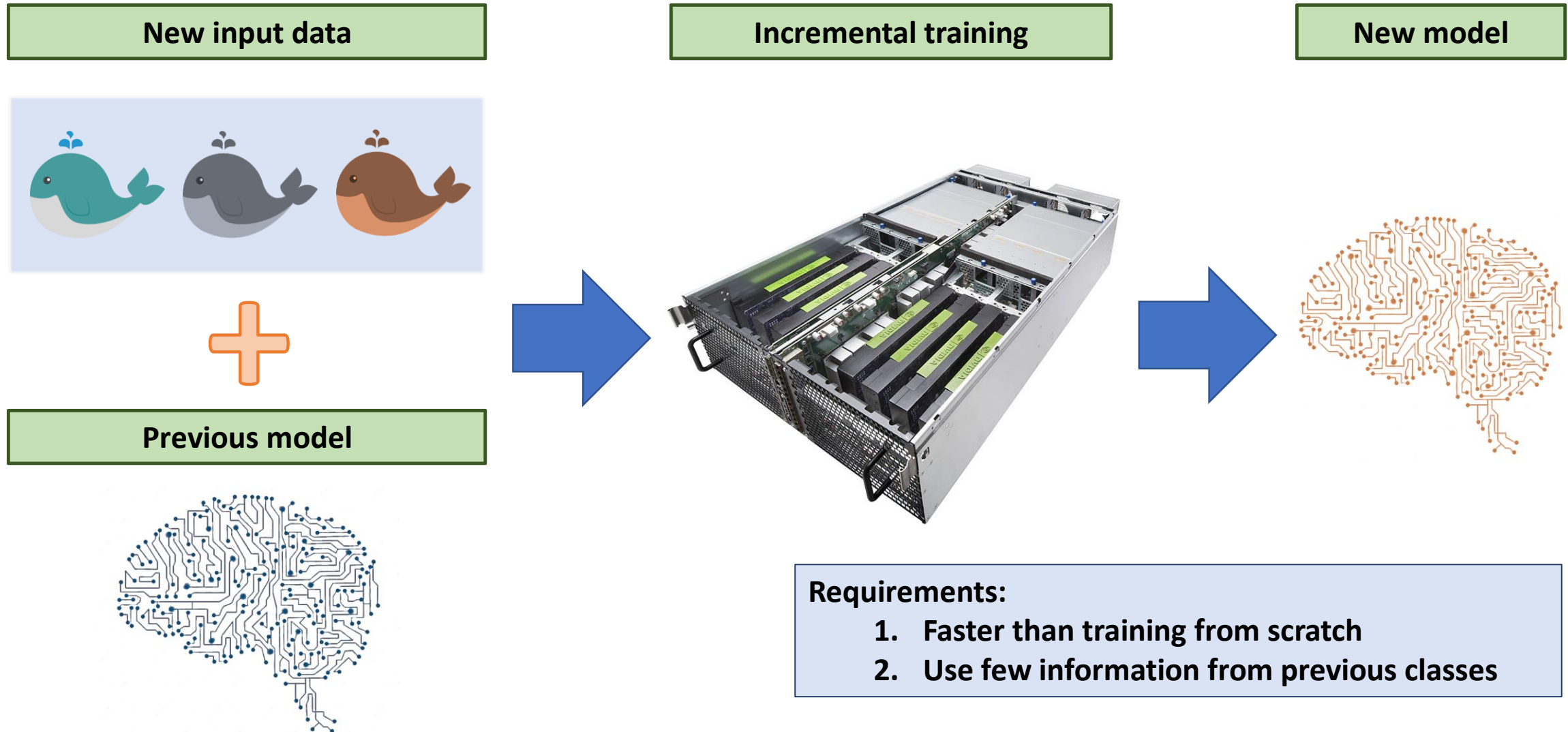
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- It is the same for computers...



**Catastrophic  
forgetting!!!**

# Incremental learning



## Requirements:

1. Faster than training from scratch
2. Use few information from previous classes

# Gait Recognition + Incremental Learning

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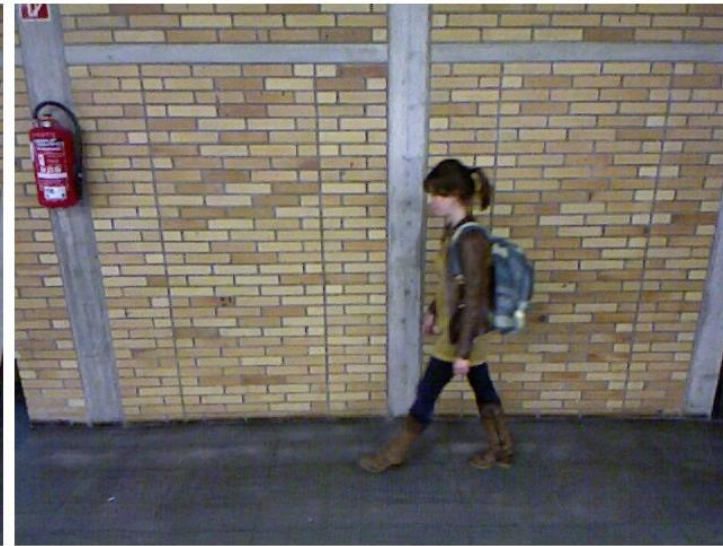
- Adding new classes



# Incremental learning on TUM-GAID



N



B



S

- 305 subjects:
  - 150 for training with N, B and S
  - 155 for testing:
    - 4 - N sequences for training
    - 2 - N, B, and S sequences for testing



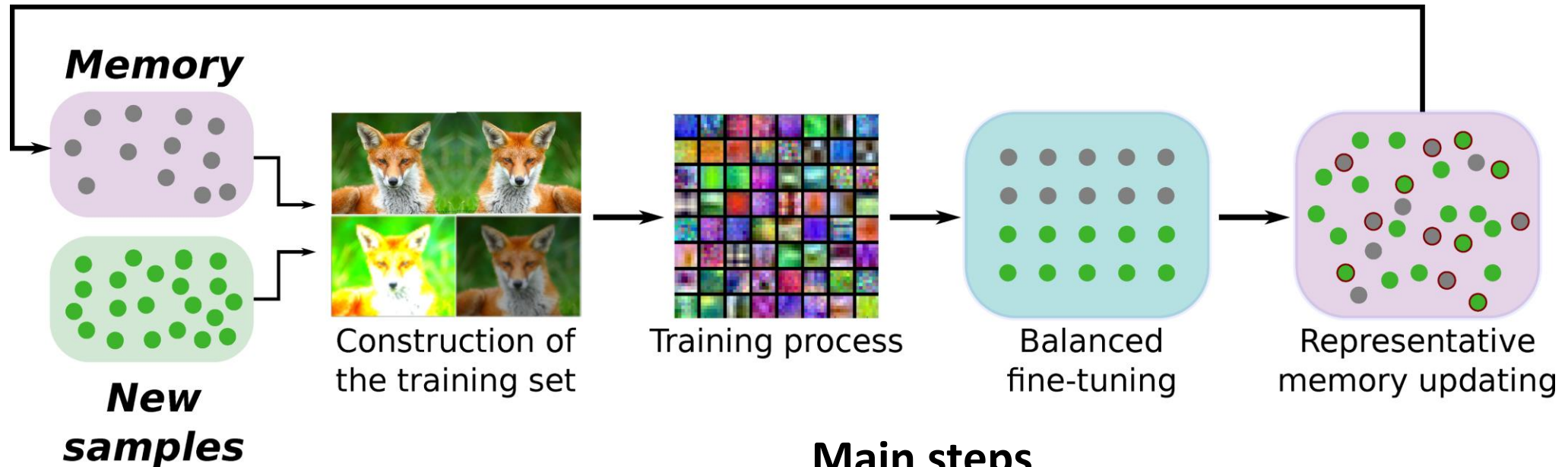
# Incremental learning on TUM-GAID



- Preliminary results with ResNet32 + OF
  - Pretrained model with 150 subjects (N+B+S)
  - Incremental learning of 155 subjects (N) + test with N,B,S samples

Model / #Classes	5	10	20	31	50
Ours	85.2	74.8	78.5	77.4	80.4
From scratch	87.4				

# End-to-End Incremental Learning - Overview



## Representative memory

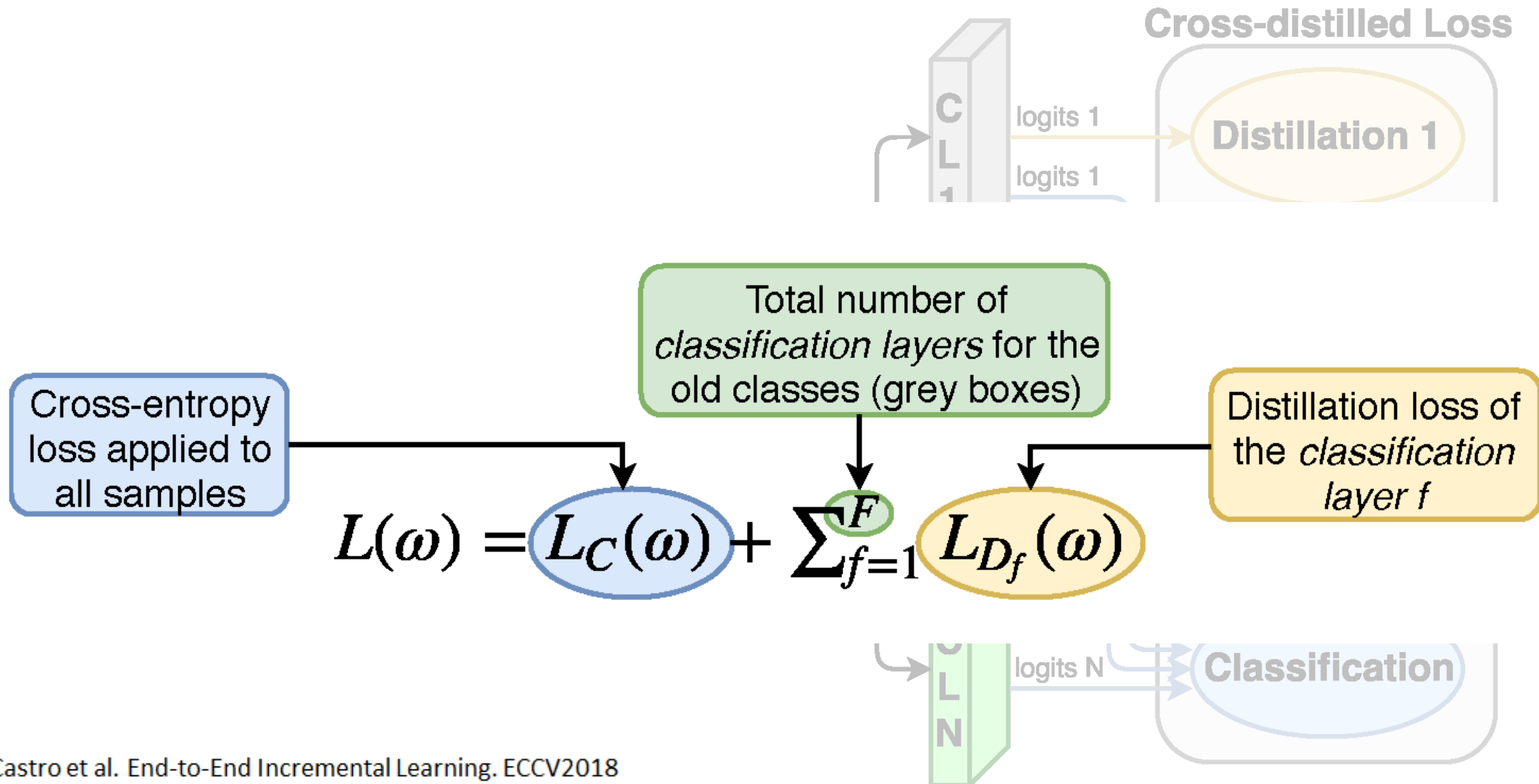
- Stores  $N$  most representative samples from old classes

- $\#samples\_class = \frac{N}{\#old\_classes}$

## Main steps

- Balanced fine-tuning
  - Less bias problem and better acc
- Update representative memory
  - Include samples from new classes
  - Builds a class prototype

# End-to-End Incremental Learning - Model



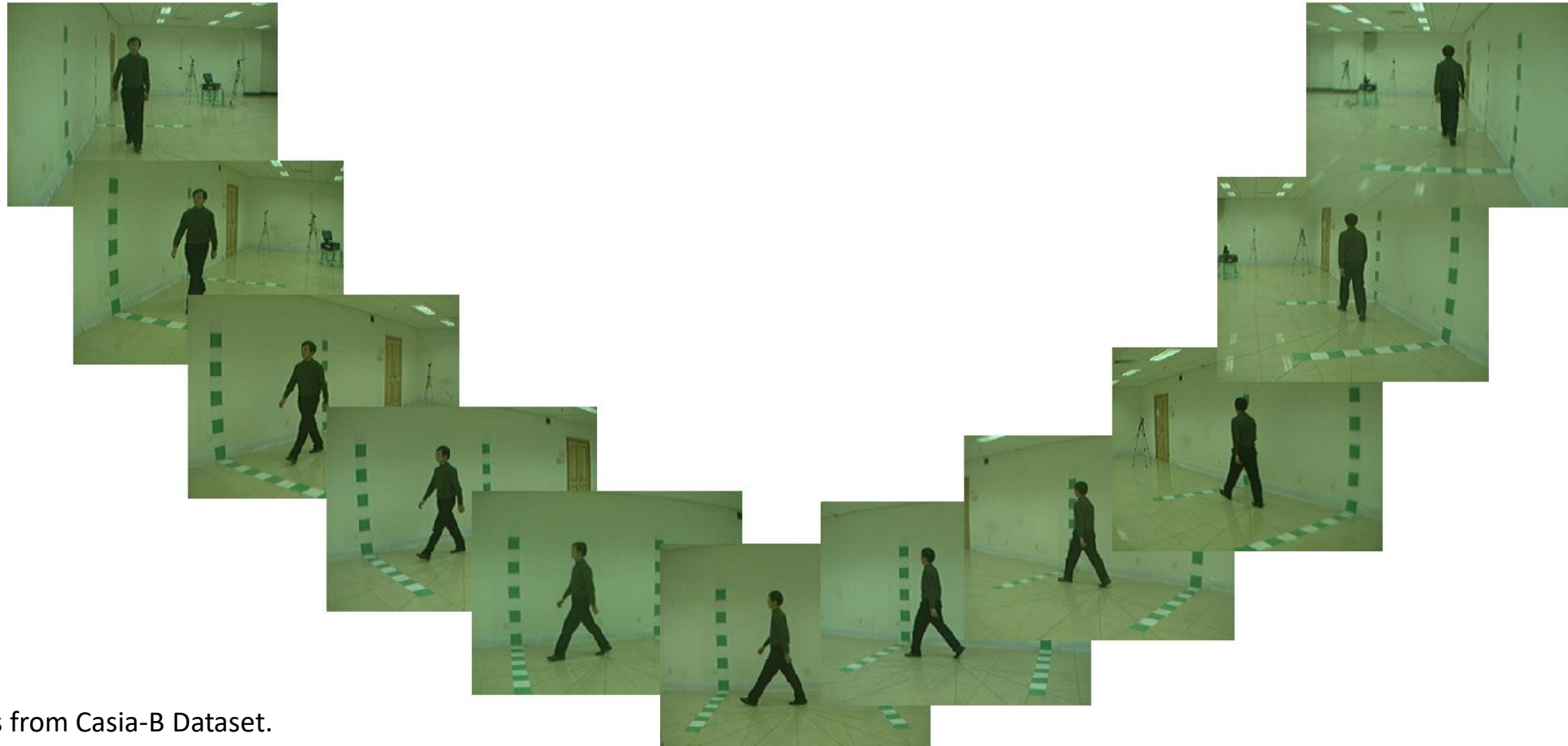
# Gait Recognition + Incremental Learning

- Adding new walking scenarios



# Gait Recognition + Incremental Learning

- Adding new view-points



Images from Casia-B Dataset.

# Take-away ideas

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- There are different ways of training a deep model
- Incremental learning can help to update a model
- Gait recognition + incremental learning is underexplored



谢谢!

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