

Automated identification of fishes in underwater images with Deep Learning algorithms

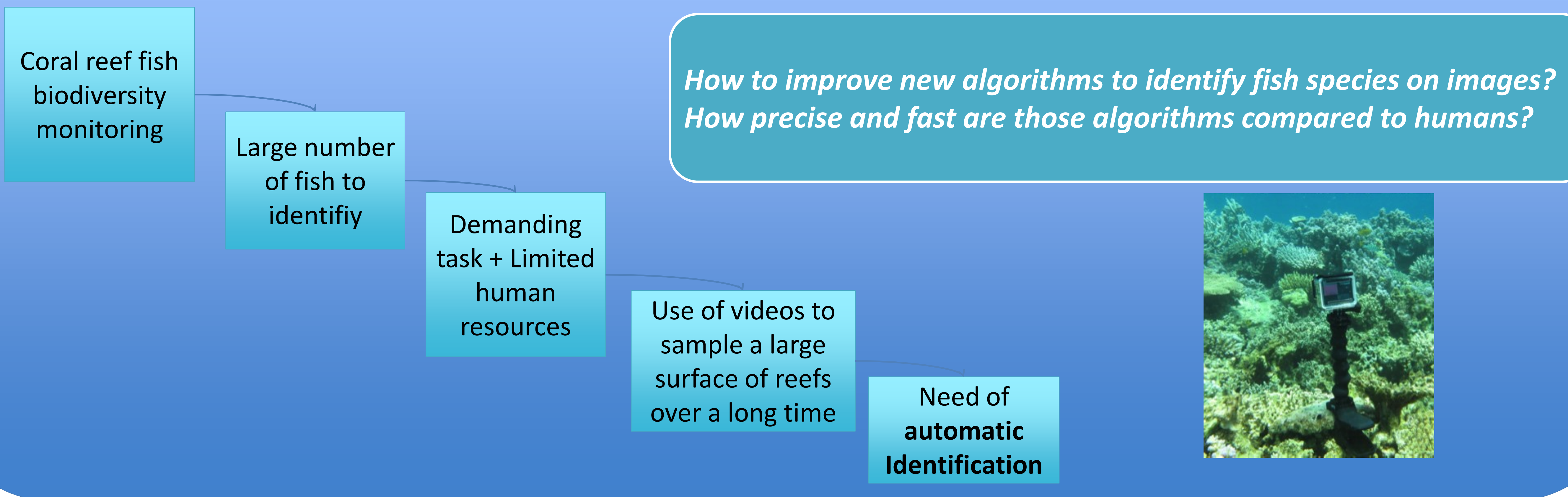


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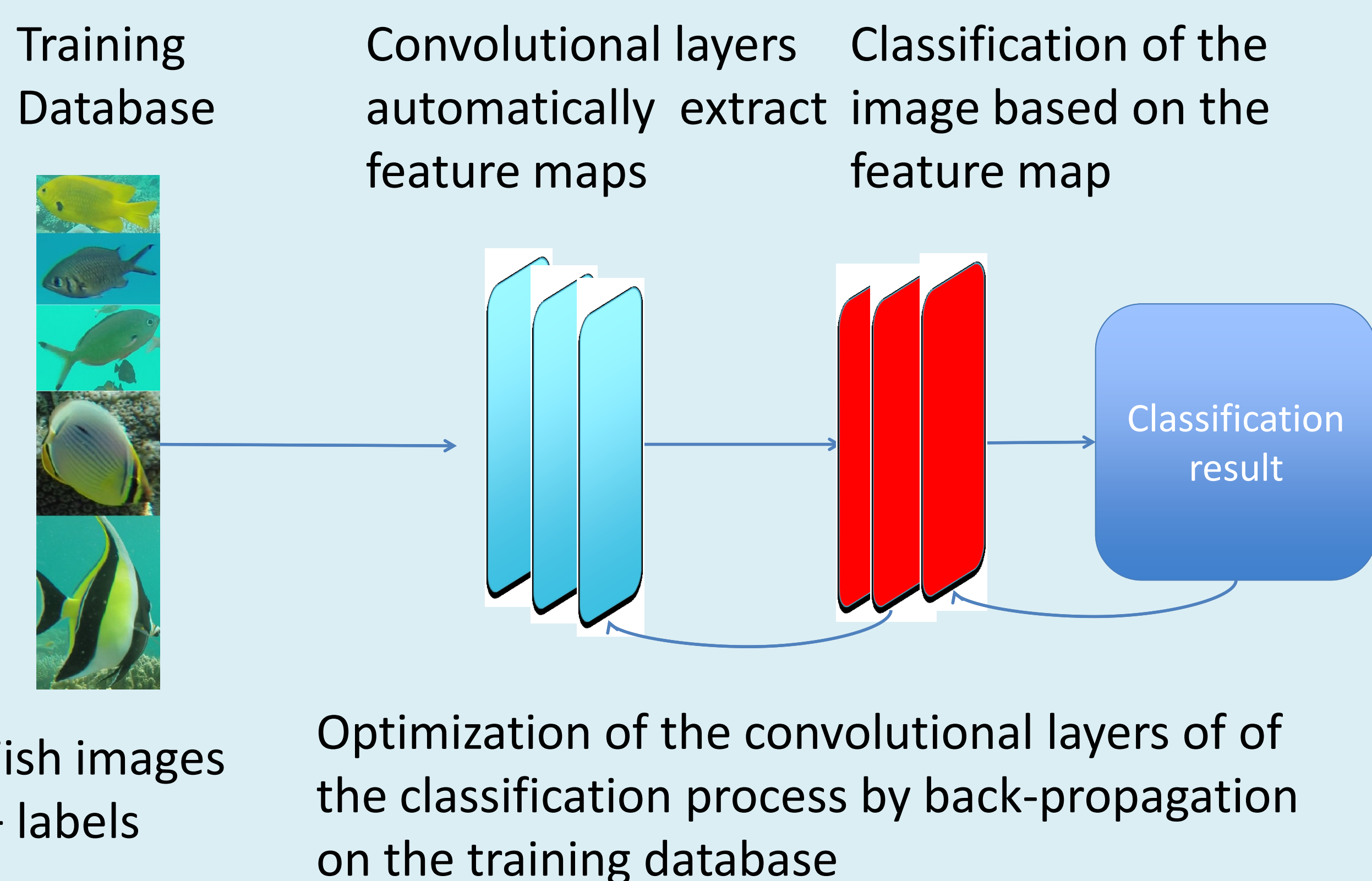
Coral reefs are increasingly impacted by global warming, pollution and overfishing. **Monitoring of fish biodiversity** can help to understand perturbation processes but need to be done over large temporal and spatial scales → **New tools are urgently needed!**



Proposed methods

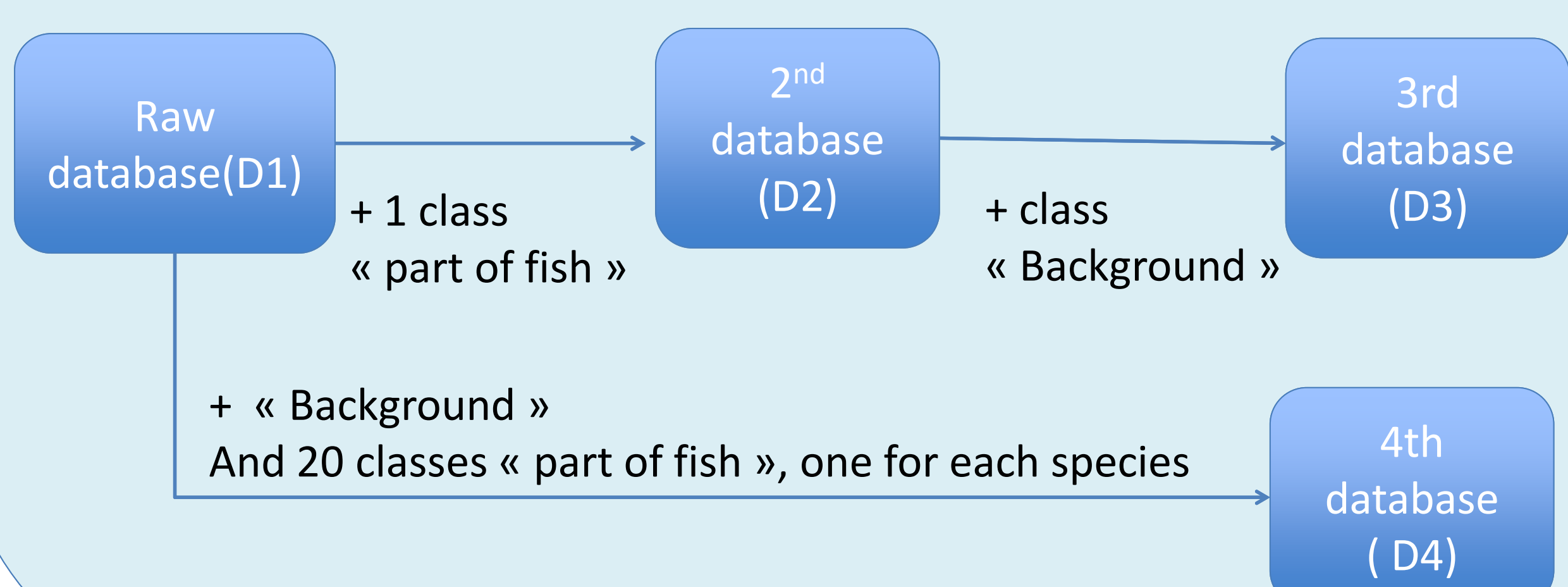
Development of a Deep Learning based method [1]

How does Convolutional neural network training works?



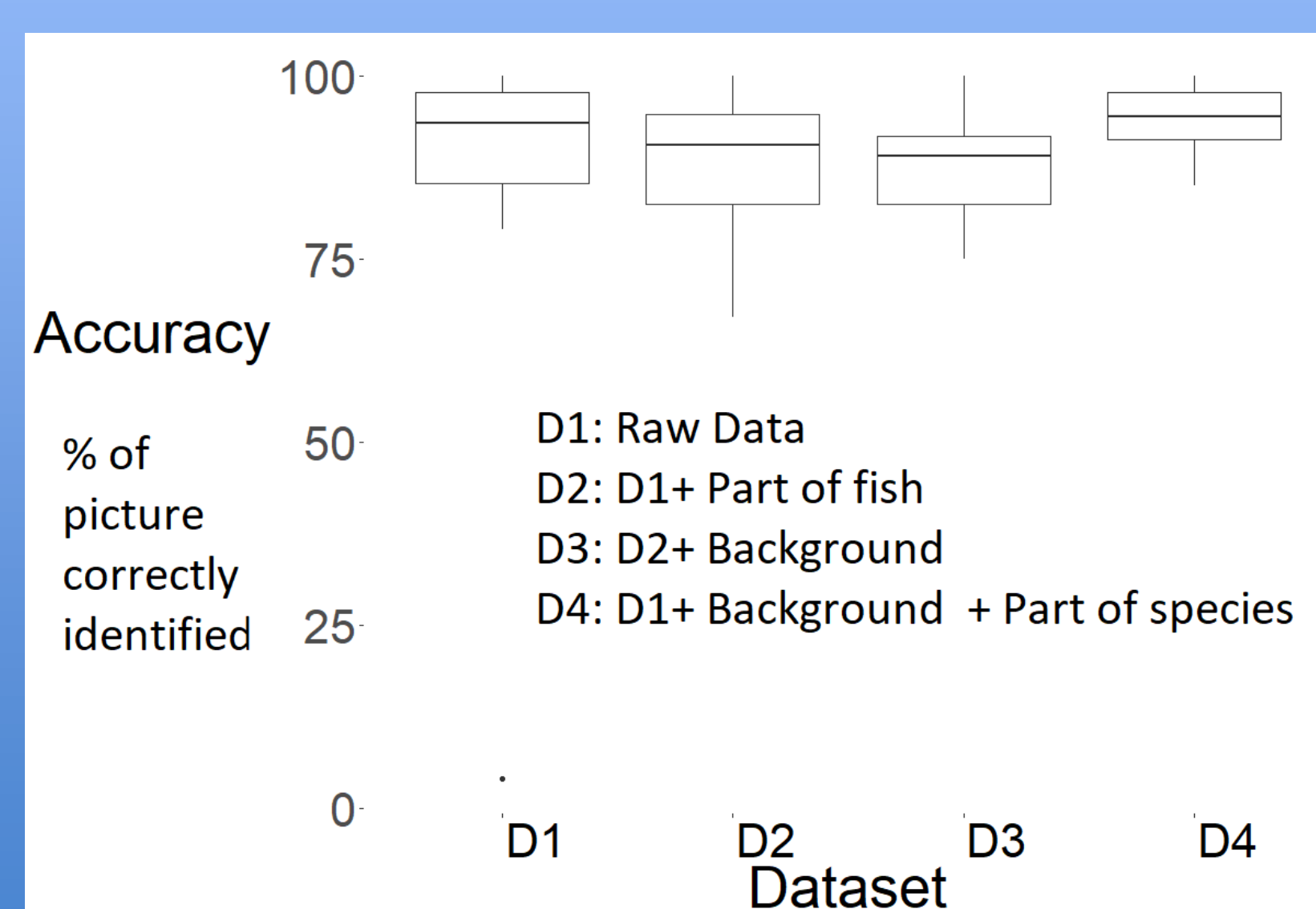
We trained a GoogLeNet architecture to obtain 4 models from our 4 databases. Models are tested on images from independent videos.

We built an image database D1 composed of **44,625** thumbnails of **20 fish species** from images manually cropped and identified. From this thumbnails database, we derived **4 training databases**:

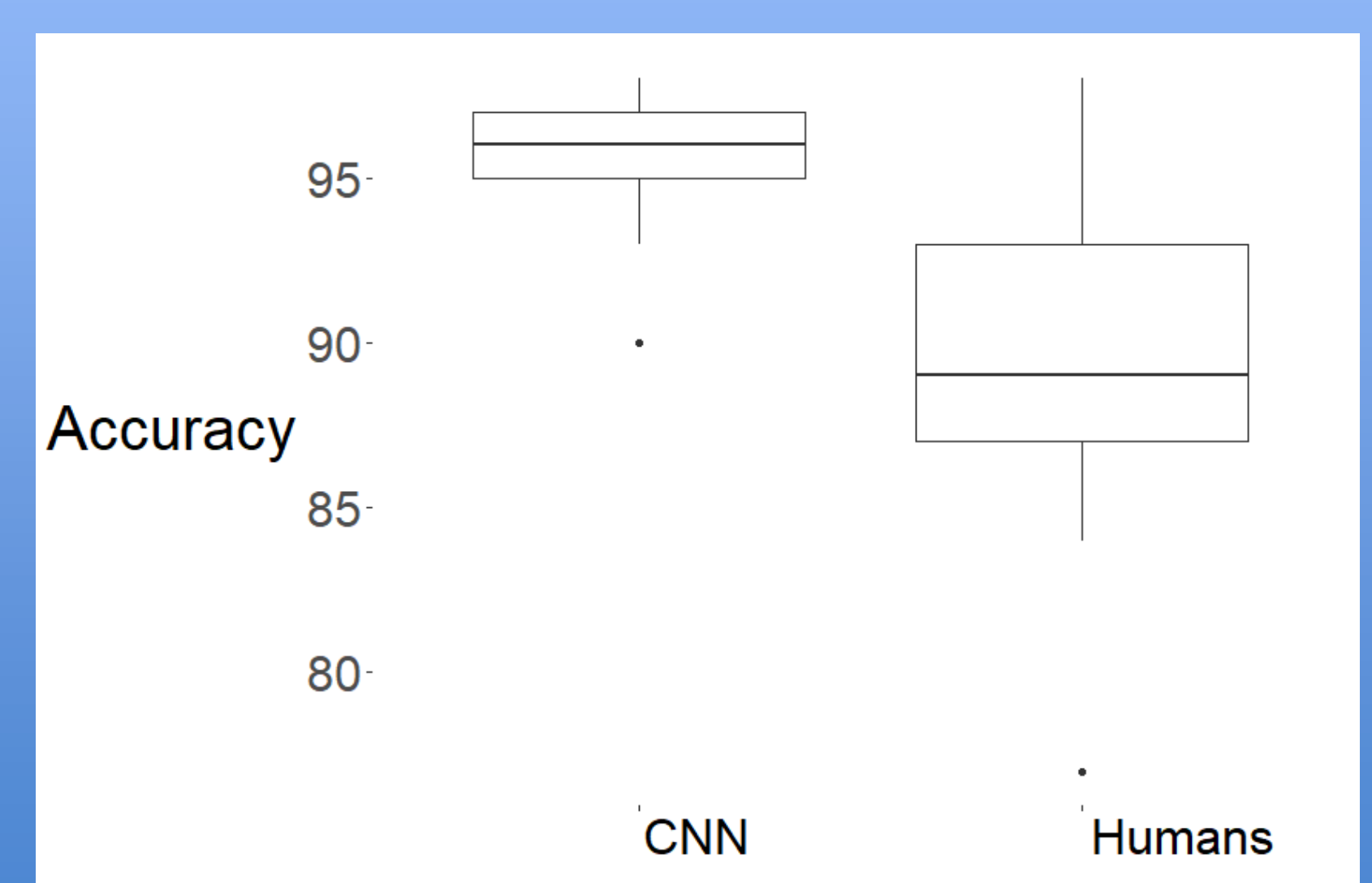


Results

- Best results with database D4 ("Part of Fish" by species + Background)
- Mean accuracy = **94.1 % on 20 species**
- Processing time: **0.06 s for a thumbnail**
- Compared to humans: 6% more precise (on 9 species) 100 times faster



Results of the 4 models on 20 species



Results of human vs CNN comparison on 9 species

Perspectives:

Develop a localization algorithm to count individuals of each species in videos. We also need an increase of the number of learned species.

