Neptune KPIs

B - Developing Community Contributions

## Why we chose the GPL license for Neptune

1. **Ensure freedom stays with the code:** The GPL is a copyleft license. This means anyone can use, modify, or distribute your code but only if they also share their modifications under the same license. It ensures that improvements to the code remain open and accessible to everyone. Without this, someone could take our model, improve it behind closed doors, and sell it without giving back to the community.
2. **Encourage community contributions:** As the models are open-source and available for anyone to use, the GPL encourages developers to contribute back to the project. This creates a cycle of continuous improvement and innovation, as more people can build on top of the existing work, benefiting everyone involved.
3. **Protect against proprietary forks:** If we had chosen a more permissive license, like MIT or Apache, someone could take our code, create a proprietary version, and not share their improvements. The GPL prevents this by requiring that any derivative work also be open-sourced under the same license.
4. **Align with our values:** The GPL aligns with our belief in open-source software and the importance of sharing knowledge. It reflects our commitment to transparency, collaboration, and community-driven development.

GPL is one of the most widely used licenses in free software. It's been legally tested, clearly written, and globally recognized. It's a **proven legal framework** that has successfully protected countless open-source projects.

Contributing to developer communities

As part of the Neptune project, we developed an open-source model for detecting water surfaces, named NWSD (Neptune Water Surface Detection).
Sharing this model with everyone saves lots of time for the people interested but it also encourages collaboration and innovation on segmentation tasks.

Link to the project : https://github.com/Ehlum-Lucas/NWSD*
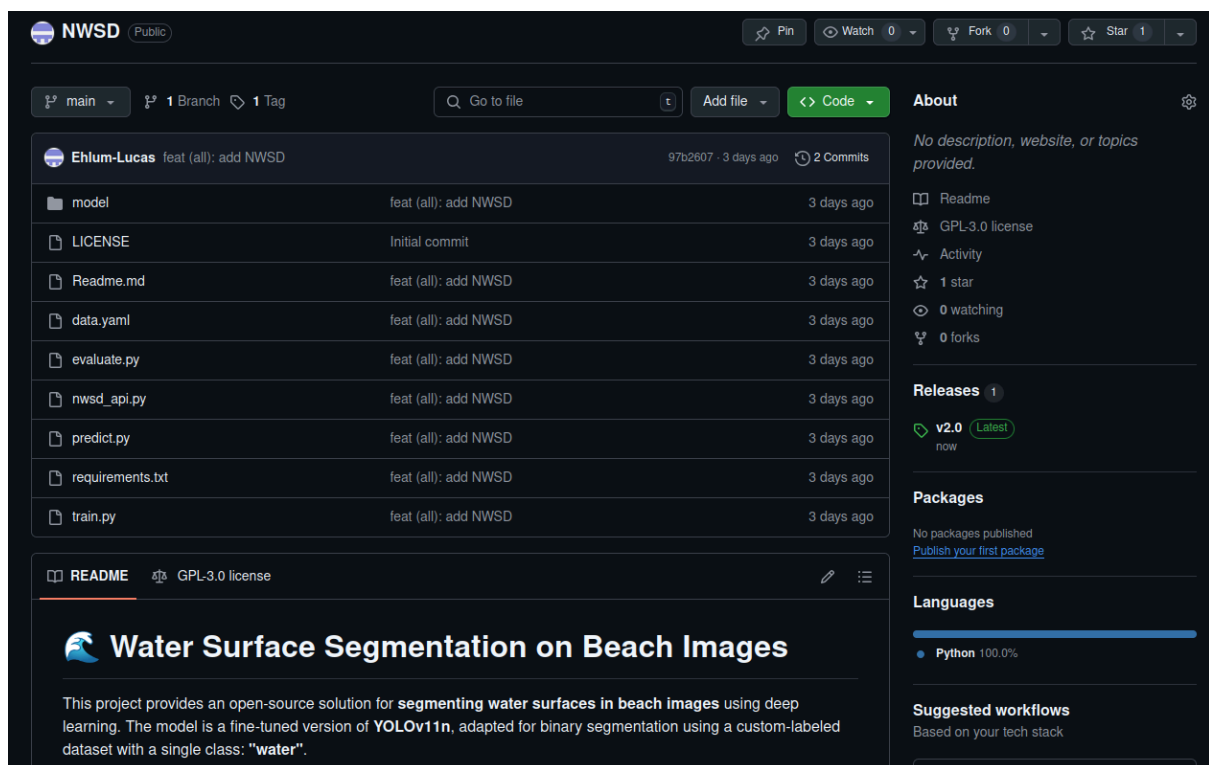
Participation in technical communities

To foster collaboration and share progress with the broader AI community, we actively participated in the **Computer Vision Discord server**, a large and active space for developers and researchers working in visual AI.

We posted a detailed message presenting our open-source segmentation model **NWSD** (Neptune Water Surface Detection), explaining its purpose within the **Neptune project**, and inviting

contributors to give feedback, suggest improvements, or help with testing and dataset expansion.

This message includes:

- A link to the public GitHub repository

- A description of the project goals and model features

- A clear call for contributions from the community

We included a screenshot of this post in our final documentation as evidence of active engagement.
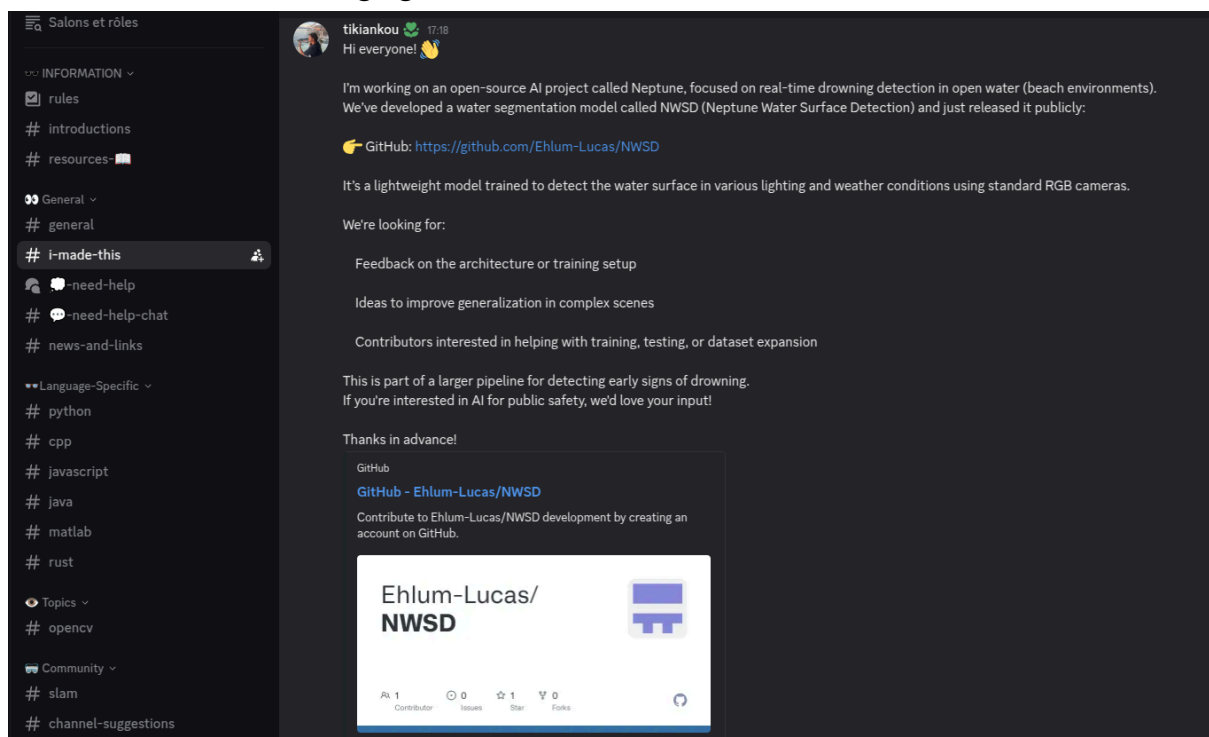
Sharing with the AI community through publication

To increase awareness and share insights with the AI community, the team published an article in *LaRevueIA* (an online blog specialized in AI)

titled "L'IA au service des sauveteurs en mer", which details how Neptune enhances safety for sea rescuers.

ML/DL   Vision

L'IA au service des sauveteurs en mer

De **L'équipe Neptune** —8 Juillet 2025 — 💬 0

SHARE

Neptune est un système d'intelligence artificielle temps réel conçu pour détecter les signes précoces de noyade sur les plages. Pensé par d'anciens sauveteurs et développé par une équipe d'étudiants passionnés, Neptune combine **computer vision**, **détection d'immersions prolongées**, **cartographie 2D** et **alertes sonores** pour assister les sauveteurs dans leur mission vitale.

Dans cet article, nous revenons sur la genèse de Neptune, ses technologies clés, et ses avancements futurs.

Interface Neptune en fonctionnement – Visualisation des baigneurs détectés et mini-carte en temps réel

Link to the article:
https://larevueia.fr/lia-au-service-des-sauveteurs-en-mer/

C - Working with technical experts

As part of the Neptune project, we proactively reached out to companies with strong expertise in computer vision applied to aquatic safety. The goal was to seek advice on the most appropriate technologies for real-time drowning detection and on how to build a relevant dataset.

Outreach Strategy

We drafted a professional message (via LinkedIn and email) introducing our project and asking for guidance. The message explained our background, the goal of the Neptune system, and our interest in leveraging industry experience.

Here is the message we used:

Dear Sir/Madam,

My name is Ariel Chambaz and I'm currently student at Epitech. For my final year project, I'm developing an artificial intelligence system designed to detect the beginnings of drowning as quickly as possible, in order to improve beach safety and help lifeguards. This initiative was inspired by my own experience as a lifeguard in France.

After learning about your company and its projects, I was particularly impressed by your expertise in this area, which aligns perfectly with the approach I am aiming to adopt. I would like your advice on the best technologies to use and how to build a suitable dataset for drowning detection.

I'm available to discuss this further at your convenience. Reach me at chambazariel@gmail.com

We identified several relevant companies and sent them this message via LinkedIn:

- **SightBit (Israel)**
  Develops AI systems for real-time beach monitoring, using video analysis to detect drowning risks and hazardous behavior.

SightBit

Ariel Chambaz • 10:02

Dear Sir/Madam,

My name is Ariel Chambaz and I'm currently student at Epitech. For my final year project, I'm developing an artificial intelligence system designed to detect the beginnings of drowning as quickly as possible, in order to improve beach safety and help lifeguards. This initiative was inspired by my own experience as a lifeguard in France.

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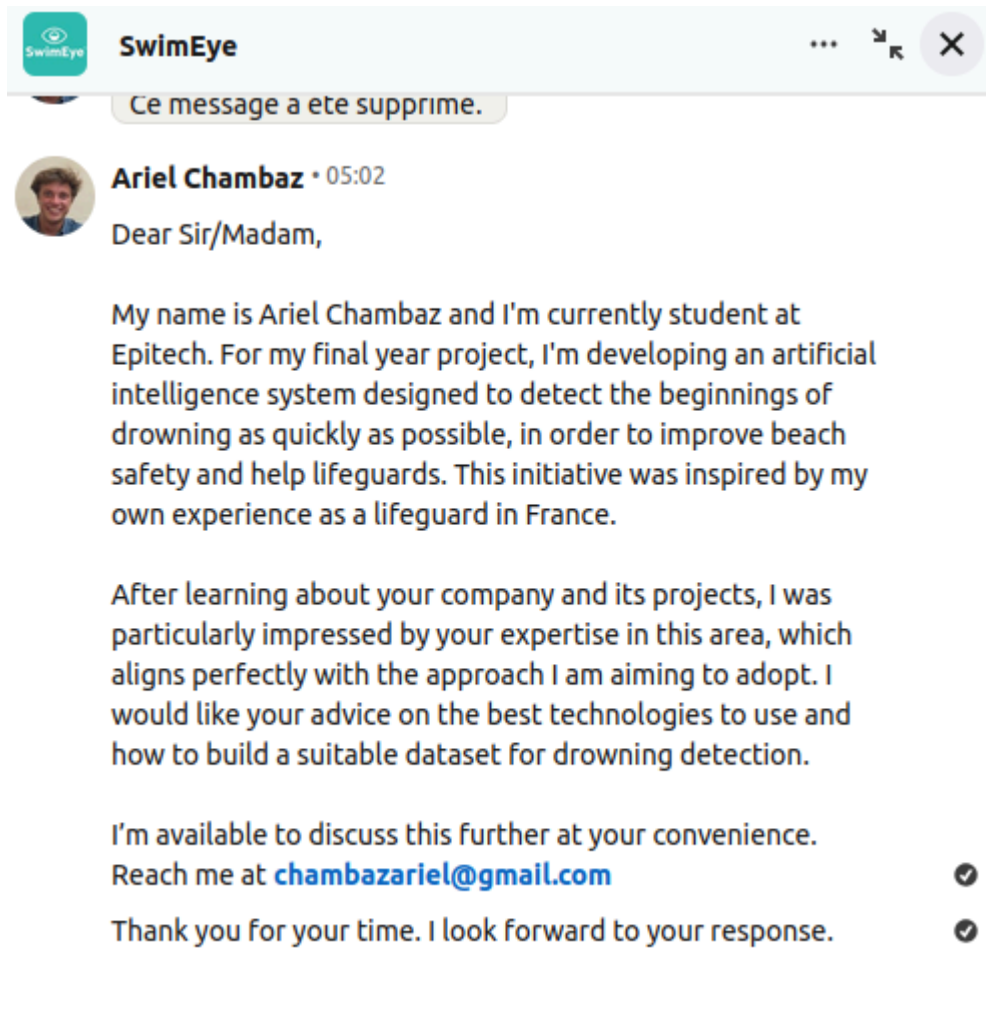
Thank you for your time. I look forward to y

- **Lynxight (Israel)**
  Specializes in AI-powered underwater behavior monitoring in pools, aiming to prevent drowning incidents.

14 OCT. 2024

Ariel Chambaz · 09:49

Dear Sir/Madam,

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After learning about your company and its projects, I was particularly impressed by your expertise in this area, which aligns perfectly with the approach I am aiming to adopt. I would like your advice on the best technologies to use and how to build a suitable dataset for drowning detection.

I'm available to discuss this further at your convenience. Reach me at chambazariel@gmail.com

Thank you for your time. I look forward to your response.

- **SwimEye (Norway)**
  Offers underwater camera systems and automatic detection of abnormal behavior in swimming pools.

Ce message a ete supprime.

Ariel Chambaz • 05:02

Dear Sir/Madam,

My name is Ariel Chambaz and I'm currently student at Epitech. For my final year project, I'm developing an artificial intelligence system designed to detect the beginnings of drowning as quickly as possible, in order to improve beach safety and help lifeguards. This initiative was inspired by my own experience as a lifeguard in France.

After learning about your company and its projects, I was particularly impressed by your expertise in this area, which aligns perfectly with the approach I am aiming to adopt. I would like your advice on the best technologies to use and how to build a suitable dataset for drowning detection.

I'm available to discuss this further at your convenience. Reach me at chambazariel@gmail.com

Thank you for your time. I look forward to your response.

- **Smart Nation Singapore**
  A government-led initiative to apply smart technologies, including intelligent video surveillance, for enhancing public safety.

Learning about your recent pilot project implementing computer vision for drowning detection in public pools in Singapore has been inspiring, as it perfectly aligns with my goals and the direction of my project. I am very interested in your insights on best practices, recommended technologies, and data collection strategies for effective drowning detection.

If possible, I would appreciate an opportunity to discuss this further at your convenience. I can be reached at **chambazariel@gmail.com**.

Kind regards,
Ariel Chambaz

Ariel Chambaz • 05:07

I'm currently in my fourth year at ITS in Surabaya, Indonesia, and it would be an honor to meet with you in Singapore to discuss this project further.

Thank you for your time. I look forward to your response.

- **AngelEye (Italy)**
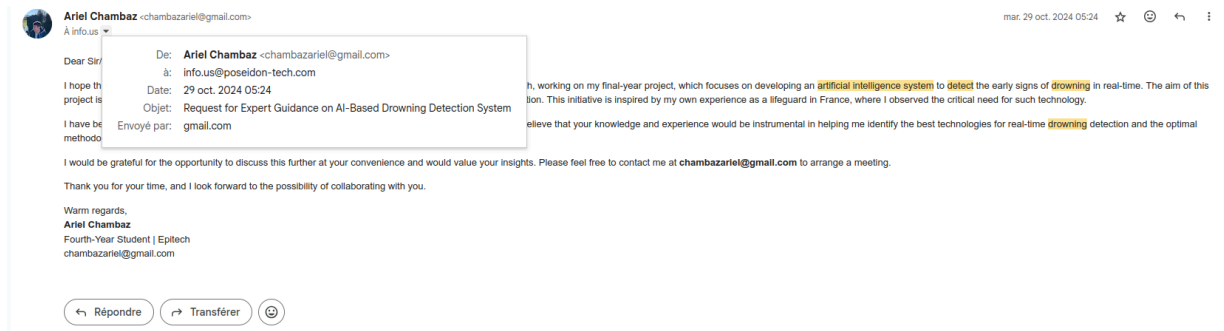 Provides intelligent drowning detection systems for public pools
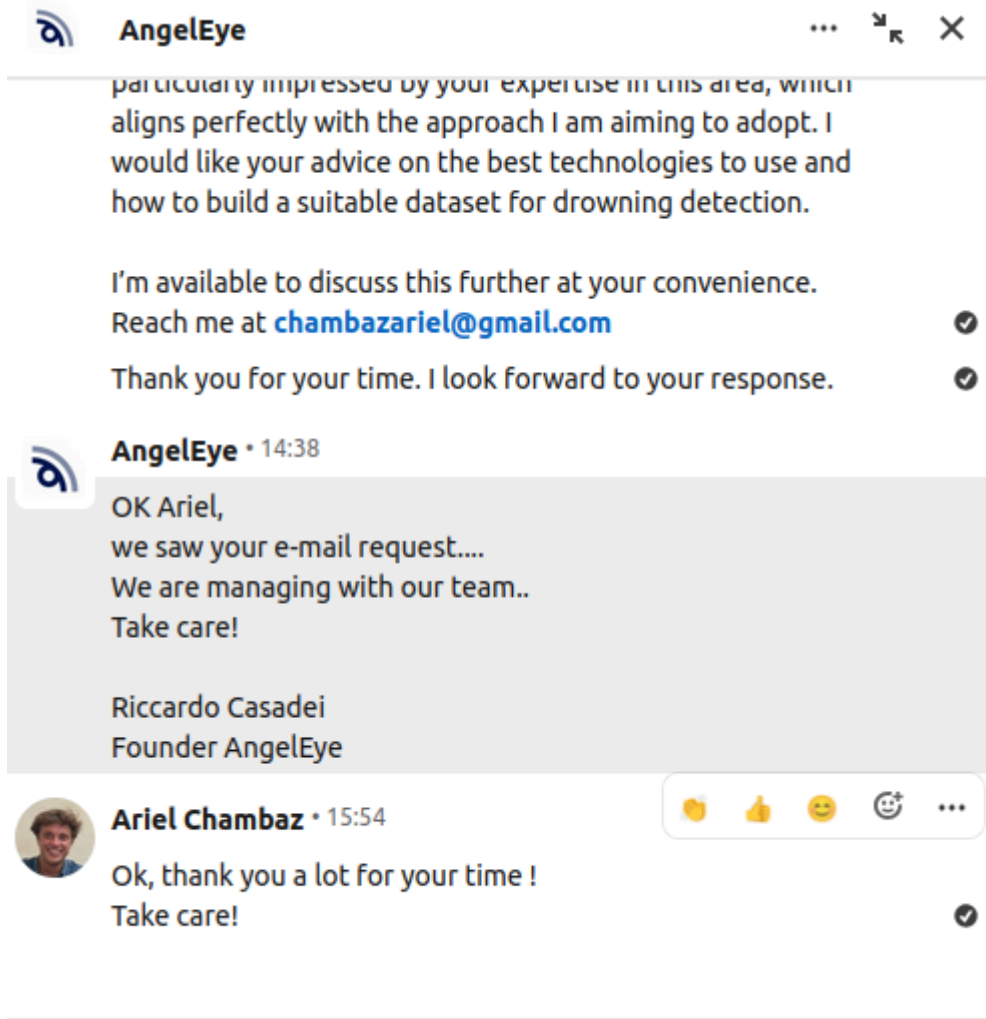
Companies Contacted via Email

We also sent direct emails to:

- **SwimEye (Norway)**
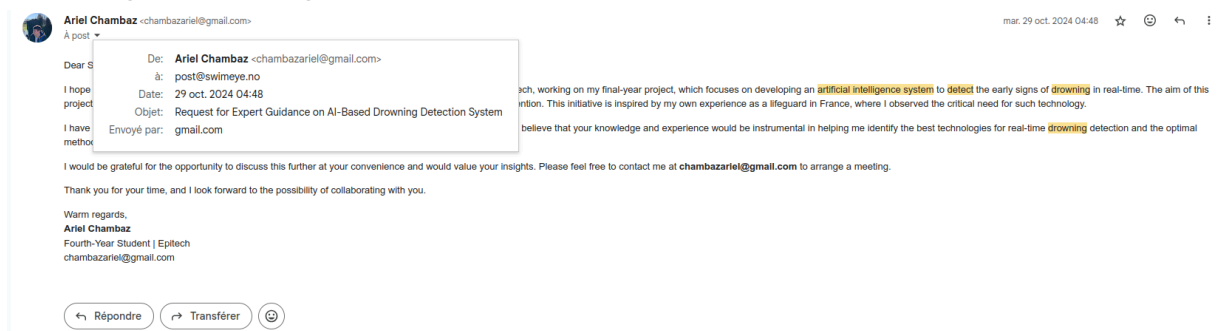
- ## **Poseidon Technologies (USA/Canada)**

Specializes in automated drowning detection systems for swimming pools. Their solution uses overhead cameras and computer vision to monitor swimmers in real-time and alert lifeguards within seconds of detecting potential drowning behavior. Poseidon is one of the earliest companies to commercialize AI-based aquatic surveillance systems.

- ## **AngelEye (follow-up email after LinkedIn message)**
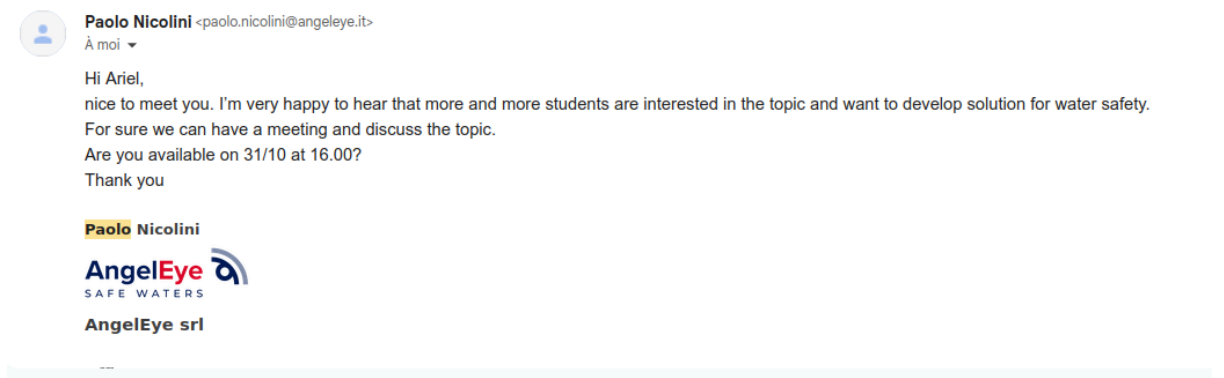
Among these, **AngelEye** responded positively and offered to engage in a technical discussion regarding our approach.

Meeting with Paolo Nicolini – Technical Director at AngelEye*

We held a technical meeting with **Paolo Nicolini**, CTO of **AngelEye**, a company specializing in drowning detection systems for swimming pools using surface and underwater cameras.

AngelEye operates exclusively in **controlled environments like pools**, where their setup combines a **standard overhead RGB camera** with an **infrared underwater camera**. Their detection logic is as follows:

- If **both cameras detect** a person, they are considered **above water**.

- If **only the RGB camera** detects the person, they are likely **underwater**, since infrared does not function below the surface.

While this method is effective in pools, **it is not applicable to open environments** such as lakes or the sea, where infrared is ineffective and conditions are more variable.

For **human detection**, AngelEye tested various existing models, including **YOLO**, but ultimately found that a **custom model** trained specifically on their data provided better performance.

They advised us to **begin testing in lake environments** before moving to the sea, due to more stable conditions (fewer waves, less turbulence, and more consistent lighting), which is better suited for early development and testing phases.

Concerning **training data**, they estimated that around **3,000 to 4,000 labeled images** are required to reach acceptable performance for person detection in water. They also validated that **YOLOv5 with transfer learning** is a realistic and efficient strategy for Neptune, especially given our limited dataset at this stage.

Regarding **drowning detection**, AngelEye does not rely on AI but uses a **rule-based algorithm** that analyses swimmer behavior patterns. However, they mentioned that a **former client** had previously worked on **open-water detection**, and might be willing to share part of the dataset collected during that initiative.

Following this meeting, we identified two development paths:

- **Build a custom model** for human detection.

- **Train a YOLOv5 model** with transfer learning and evaluate its performance.

A **comparative analysis** of both approaches is planned to determine the most appropriate one for Neptune. We also intend to schedule a **follow-up meeting** with Paolo Nicolini or AngelEye's AI lead to further discuss implementation and dataset access.

The meeting confirmed that our technical direction is valid. The **key obstacle remains the acquisition of a reliable dataset** for training and validating our detection models.

Ongoing Collaboration with AngelEye

Following the meeting, we are currently in active contact with AngelEye to explore a potential **dataset sharing opportunity**. Paolo Nicolini mentioned that one of their former clients had developed a system for **open-water drowning detection**, which aligns closely with Neptune's objectives. Although that client ultimately **abandoned the project**, the dataset they collected **still exists** and may be accessible.

AngelEye is currently **investigating the possibility of granting us access** to part of this dataset. If successful, this could significantly accelerate our progress and improve the performance and reliability of our models.

This potential collaboration is still under discussion, but it marks a promising step toward building **industry-grade training data** and ensuring that our solution remains grounded in **real-world constraints**.

We will continue this exchange with AngelEye over the coming weeks and plan to report on the outcome in a future update.