Algorithms in Action:
How Aquabyte Transformed Fish Farming with Underwater Intelligence

How one Norwegian company uses computer vision and machine learning to address a €275 billion industry's biggest challenges

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The Problem: When Fish Farming Felt More Like Guesswork

Picture this: You're managing thousands of fish in underwater pens, trying to keep them healthy, free from parasites, well-fed, and profitable. But here's the catch – you can't see what's happening underwater without physically disturbing the fish, which causes stresses and potentially harms them.

This is the reality for most aquaculture farmers worldwide. In an industry expected to grow 50% by 2030 to feed our hungry planet, fish farmers were operating almost blind, relying on what industry insiders called "gut feeling" and "more art than science" approaches.

The numbers are staggering:

- 54 million fish died in Norway alone last year during the sea phase
- 70% of production costs went to feed, much of which was wasted
- Manual sea lice counting required stressful physical handling of fish
- Environmental pollution from uneaten feed and waste was mounting

Fish farming was facing a classic scaling problem:

how do you grow responsibly when your current methods aren't sustainable?

Enter Aquabyte: The Underwater Inspector

Founded in 2017 by Bryton Shang, Aquabyte was driven by a bold and forward-looking vision: what if the same AI technologies that power facial recognition systems and autonomous vehicles could be trained to understand, in real time, what's happening inside fish farms?

The company's defining 'aha moment' stemmed from a brilliantly straightforward question — if computers can be trained to recognize millions of human faces in crowded airports, why shouldn't they also be able to count tiny sea lice on salmon or detect subtle signs of stress in fish as they swim through the water?

The Technical Magic Behind the Scenes

Aquabyte's technology might at first feel like something straight out of a sci-fi movie, yet in reality it's built on practical, proven, and often well-established systems and AI applications. Let's dive deeper and see what is hidden underneath the surface:

The Hardware:

- Custom underwater stereo cameras (Atlas and Hammerhead models) that capture over 1 million high-resolution images daily
- Depth sensors that enable fish farming's version of 3D vision
- Environmental sensors measuring temperature, oxygen, and salinity

The AI Brain:

- Computer vision algorithms trained on thousands of annotated fish images
- Edge processing that filters relevant data at the camera level and reduce data transmission
- A data layer that integrates inputs from the various cameras and sensors
- Machine learning models that get smarter with every farm they monitor

The User Experience:

- A web portal accessible on any device showing real-time insights
- Historical data going back 12 months
- Transparent results where farmers can see the actual images behind each analysis

The Solutions: From Reactive to Predictive Farming

Aquabyte didn't just digitize existing processes – they reimagined how fish farming could work. Their modular platform tackles the industry's biggest pain points:

1. Aquabyte WEIGHT

Instead of stressing fish with manual sampling, underwater cameras now provide:

- Daily biomass and weight updates
- Two-week weight forecasts for harvest planning
- Accurate fish counts without touching a single fish

Real impact: Farmers can now predict optimal harvest timing and plan resources weeks in advance.

2. Aquabyte LICE

Sea lice counting went from a time-intensive manual chore to automated precision:

- Daily automated counts of different lice types
- Two-week lice forecasts predicting potential health and safety regulation violations
- Integration with other products for a comprehensive insight into optimal harvesting times

Real impact: Fewer treatments needed, less fish stress, and proactive regulatory compliance.

3. Aquabyte WISE Welfare

Transforming subjective welfare checks into objective data:

- 14 automated welfare indicators from the Laksvel protocol (a standardised, operational welfare monitoring protocol for Atlantic salmon)
- Detection of winter sores and deformations
- Continuous monitoring and near real-time updates instead of periodic manual inspections

Real impact: Early intervention prevents widespread health crises and mortality.

4. Aquabyte BEHAVIOUR
Fish behaviour tells a story – if you know how to read it:

- Monitors swim speed, tilt, and breathing patterns
- Stores video clips of potential issues for historical analysis
- Provides early warnings for stress and gill health issues

Real impact: Problems are caught before they become crises.

5. Feed Optimization
Precision feeding based on actual appetite and fish size:

- Real-time appetite detection
- Optimized feed recommendations
- Dramatic reduction in waste and environmental impact

Real impact: Massive cost savings in an industry where feed represents 70% of expenses.

The Results: When AI Meets Aquaculture

The transformation stories from Aquabyte's customers read like business fairy tales:

Kaldvík (Iceland): From Reactive to Predictive
Before: "We were always reacting to events as they happened"

After: "We now have continuous oversight of trends and developments throughout the year, with greater predictability and better insights to make decisions in advance"

Arnøy Laks (Norway): From Stressful to Seamless
Before: Manual counting required "unnecessary and harmful handling" of fish

After: "We can let the fish be undisturbed in the pen" while getting better monitoring data

Sinkaberg (Norway): From Data to Insights
Before: Limited visibility into farm operations

After: Deep data analysis helps "identify areas for improvement, optimize operations, and prevent similar situations in the future"

The Bigger Picture: Scaling Sustainable Protein

Aquabyte's impact extends far beyond individual farms. They're addressing fundamental global challenges:

- Environmental Sustainability: Reduced feed waste means less pollution and better water quality. Optimized treatments mean fewer chemicals in the ecosystem.
- Food Security: By making fish farming more efficient and profitable, Aquabyte helps scale sustainable protein production to feed a growing global population.
- Animal Welfare: Non-invasive monitoring reduces fish stress and improves overall welfare.
- Economic Viability: Data-driven decisions replace guesswork, leading to better margins and more predictable outcomes.

The Lessons: What Makes AI Transformation Successful

Aquabyte's journey offers valuable insights for any industry considering AI adoption:

1. **Start with Real Pain Points**

   Aquabyte didn't create solutions looking for problems. They tackled genuine industry challenges: high fish mortality, regulatory compliance, and operational inefficiency.

2. **Make AI Transparent, Not a Black Box**

   Farmers can see the actual images and algorithms behind every decision. This helps adoption and builds trust with users – crucial for any AI implementation.

3. **Think Integration, Not Point Solutions**

   Rather than solving individual problems in isolation, Aquabyte created a platform where welfare, growth, behaviour, and environmental data work together for holistic insights.

4. **Focus on the User Experience**

   Complex AI technology is hidden behind intuitive interfaces accessible on any device. The sophistication is in the backend; the frontend is deceptively simple.

5. **Build Partnerships, Not Just Products**

   Aquabyte positions itself as a strategic partner, not just a technology vendor. They work collaboratively with customers to continuously improve their solutions.

The Future: Where Underwater AI Goes Next

The aquaculture industry is on the brink of widespread digital transformation. Industry leaders predict that "automatic counting will become a 'must'" and regulatory bodies are increasingly expecting "data-driven oversight."

Aquabyte is pioneering this future, proving that AI can solve real-world problems in unexpected places – even 5 meters underwater. Their success demonstrates that the most impactful AI applications often come from reimagining traditional industries rather than creating entirely new ones.

As we face growing global challenges around food security, environmental sustainability, and efficient resource use, companies like Aquabyte show us that the future might just be swimming right beneath the surface, waiting for the right AI solution to bring it into clear view.

Want to learn more about how AI is creating real value?

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