

The Rise of Machine Learning in Marine Ecology Research

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Background

- In the Aleutian Islands, the Western stock (Figure 1) of Steller Sea lions (SSL) is **endangered**.
- Threatened by food competition and other climate change factors.



Figure 1: A map of the endangered Western SSL stock and the recovered Eastern SSL Stock.

- NOAA is in charge of tracking and recovering their population, and AI is the next step to process through SSL imagery.
- Processing through population data can be **time-consuming** and **costly**.

Research Question

Will machine learning provide faster deliverables for the Western Steller Sea Lion population and be more accurate than human observation; and how does that differ across site locations?

Internship/Methods

- Processed 25k images of one Aleutian Island site's images remotely identifying branded Sea Lions.
- I ran a comparison between the accuracy of the same images through R analysis.
- Program used was PhotoCount.



Figure 2: Example of a "branded" SSL.

Results

The time it took to process 25k images:

3 weeks

10 weeks

AI MODEL

HUMAN OBSERVER

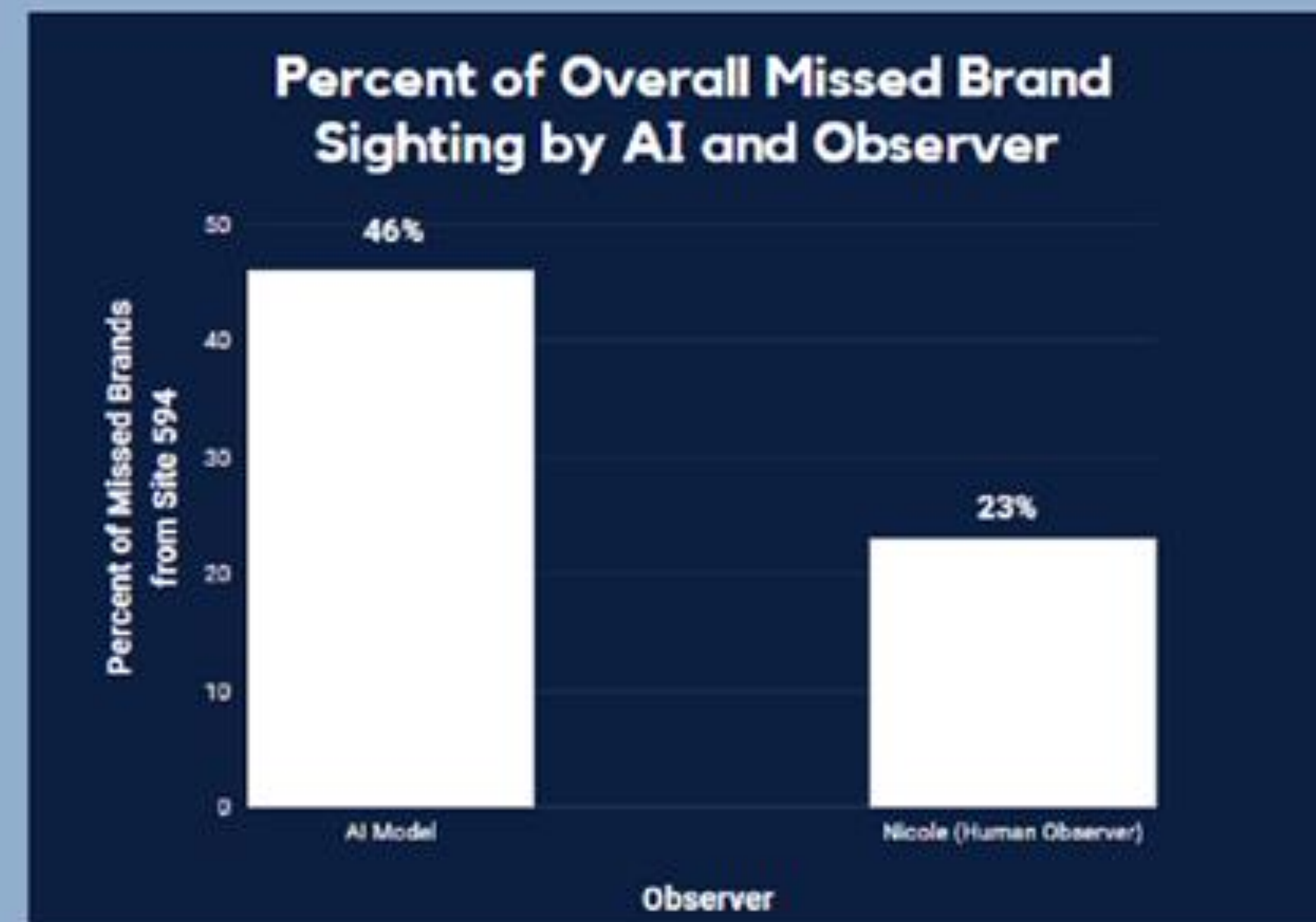


Figure 3: The % of overall missed brand-specific SSL sightings by the AI compared to the observer.

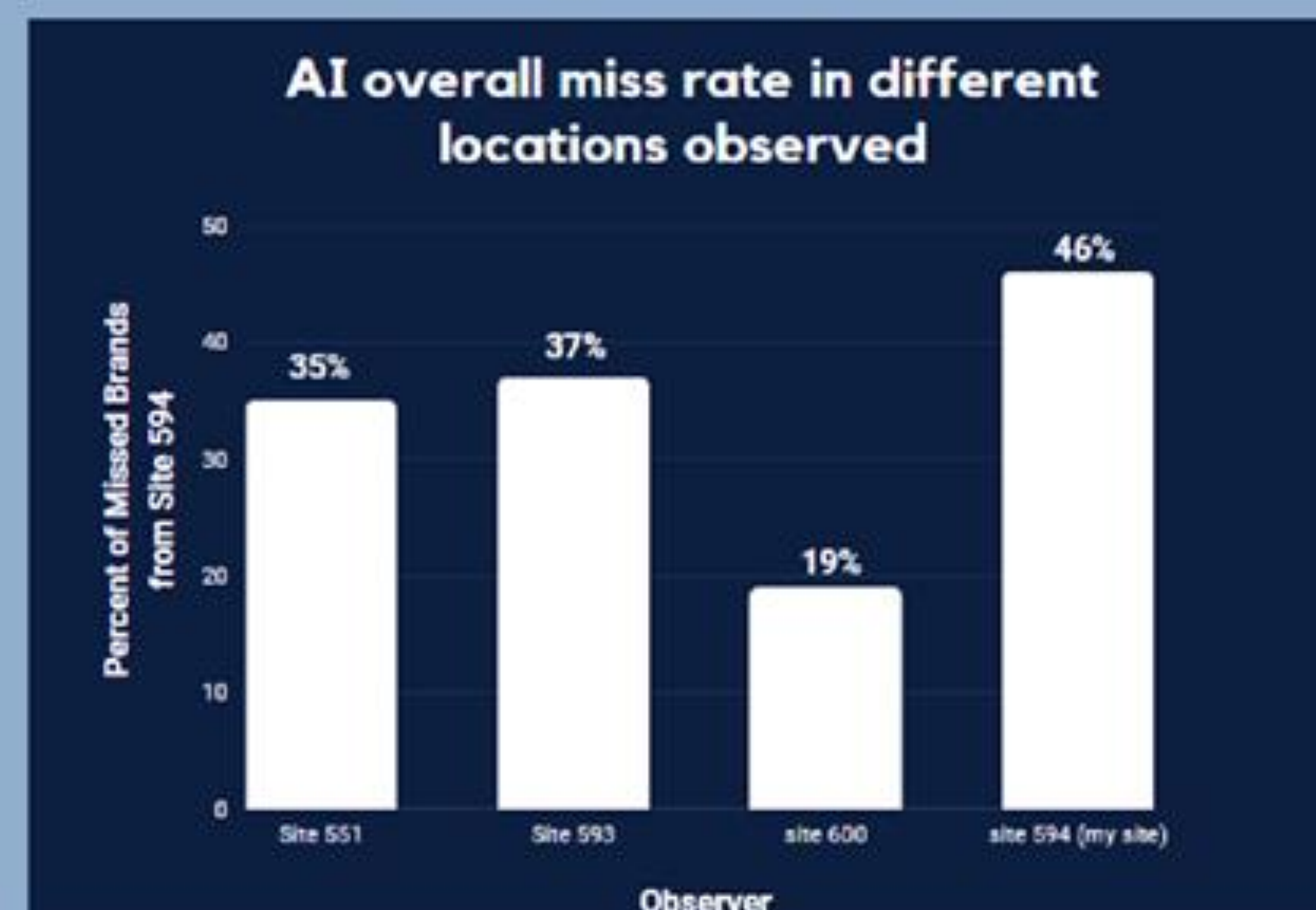


Figure 4: The % of the miss rate for the AI among locations. The comparisons are with multiple observers.

Takeaways



The AI model is not as good as human observers at observing Steller Sea Lions.



The miss rate for the AI differed among locations and has yet to be improved.



AI is faster at providing deliverables.



The AI model still needs more training before being relied on to process images for NOAA.

Implications

Once the AI model is properly trained to reach human accuracy:

- AI can assist in identifying important trends and patterns in ecosystems
- It saves the time and cost that human labor takes to process data.
- NOAA can efficiently create policies to protect Western SSLs.



Figure 5: The Steller Sea Lion found is ~175 at one of the five Agattu sites in Alaska.

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