



# iNatator: Obtaining Expert Feedback on Species Ranges

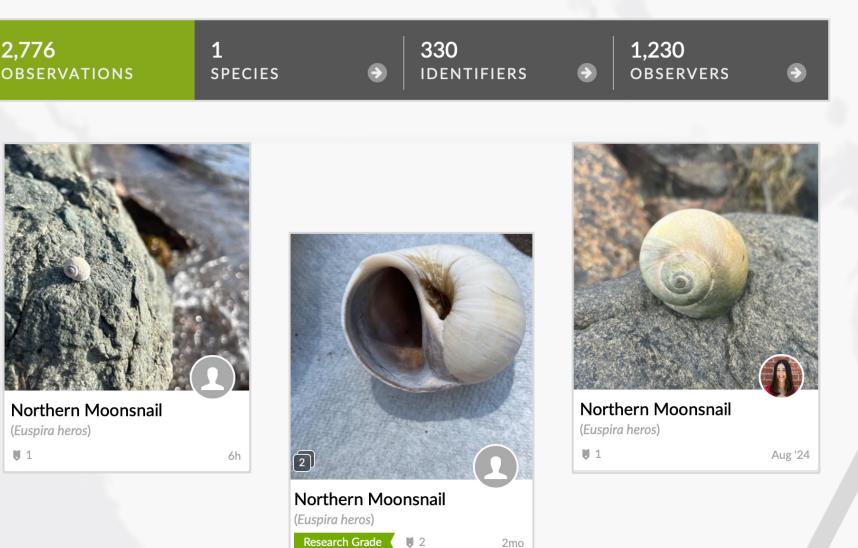
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## Motivation

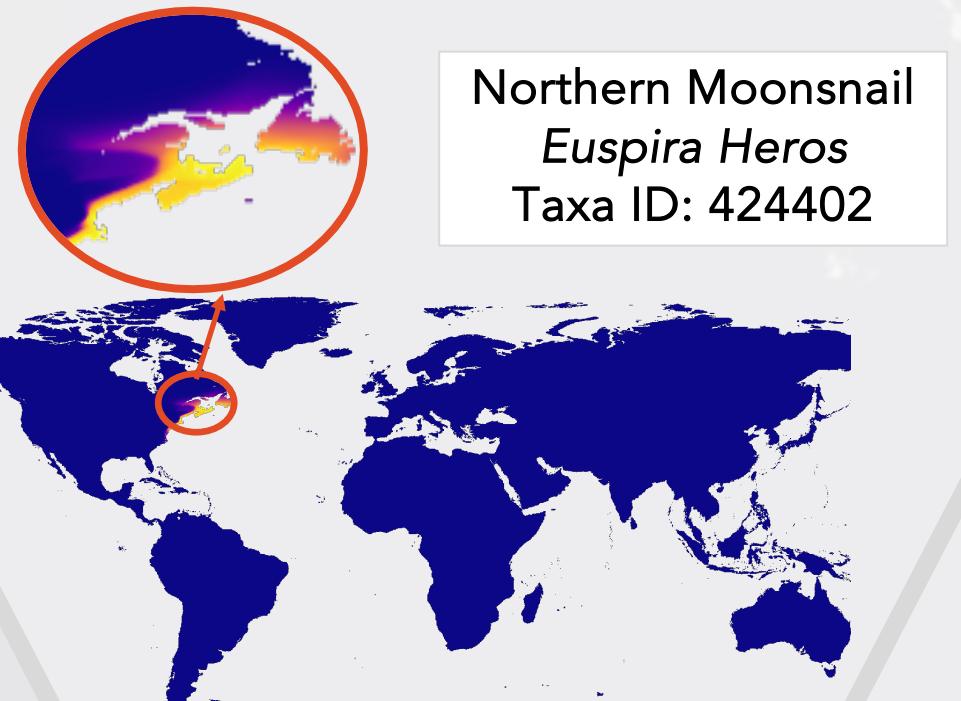
### What is iNaturalist?

Social network where people share biodiversity information by posting observations and tagging species

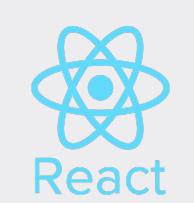


### What is the GeoModel?

A neural network ML model trained on iNaturalist observations to predict the likelihood of a species being present at a location<sup>1, 2</sup>.



## Tech-Stack



Java-Script based Front-end



Python based Back-end



Deployment and containerization



Interactive map and annotation tools



Data Storage

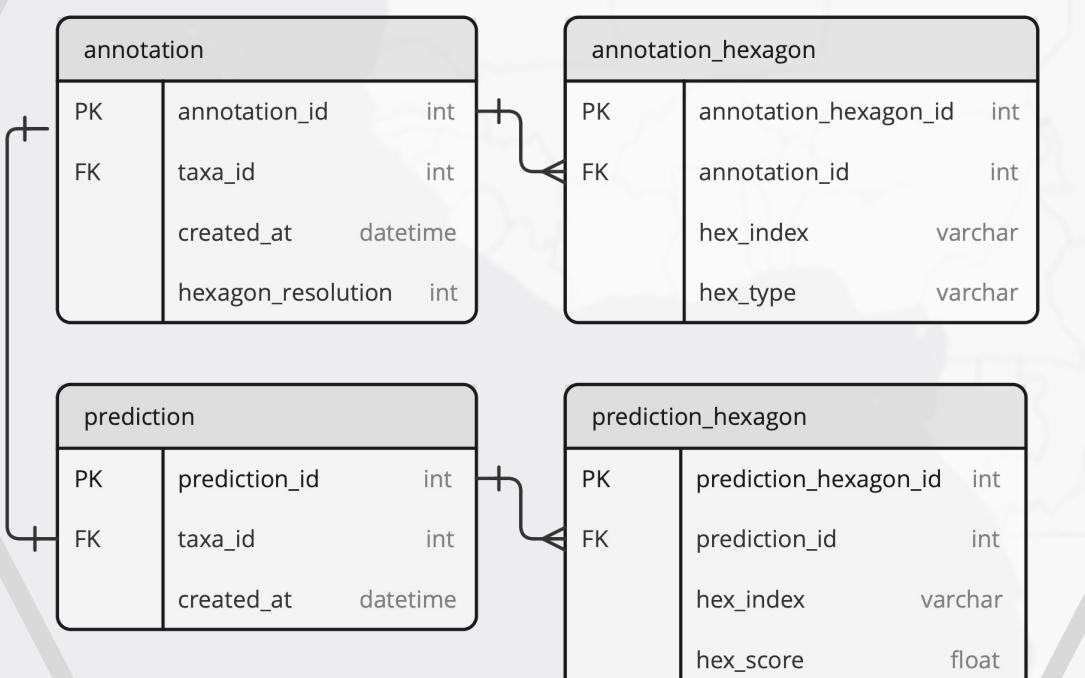
## Contribution

We created a platform that allows obtaining expert feedback through annotations of species ranges in an interactive map.

Experts can select green hexagons as presence and red hexagons as absence in the map, according to their expertise

## Database

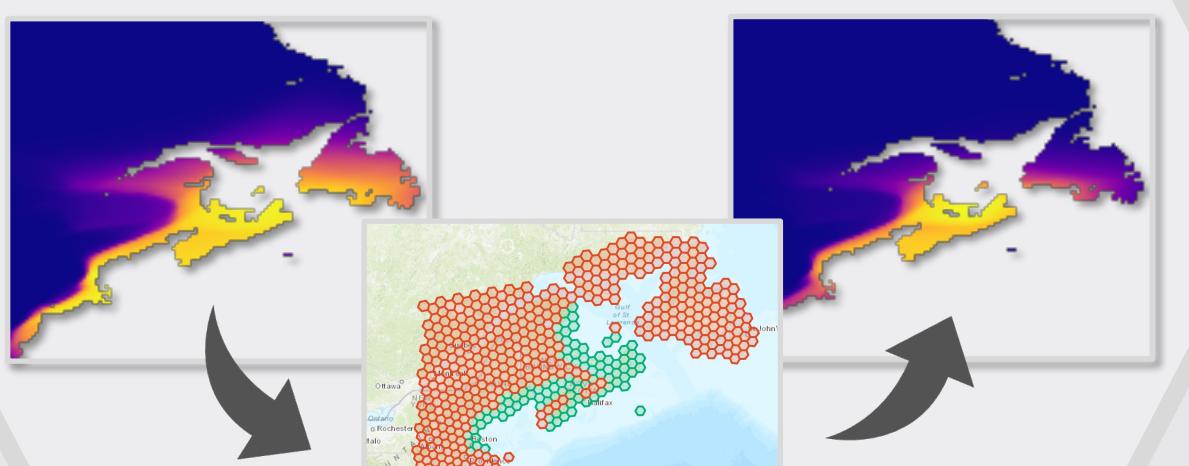
We designed and implemented a database to store annotations...



... and precomputed GeoModel predictions

## Fine-tuning

Annotations used to fine-tune the model and correct predictions by retraining last layer



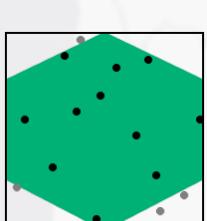
Changes annotated species, while preserving unannotated ones.

**"We want experts that understand species range maps to share their knowledge to incorporate it into the GeoModel and improve species ranges predictions"**

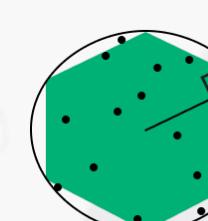
## Data Extraction

Convert annotation hexagon indexes into presence/absence labeled coordinates.

Two different sampling strategies to achieve this:



Polygon sampling (slower, more accurate)



Circle sampling (faster, less accurate)

1 Search species by common name or Taxa ID

2 Start annotation from Geomodel prediction given a threshold Previously saved annotation Empty map

3 Annotate by selecting and deselecting presence (green) and absence (red) hexagons, according to your species range expertise

4 Once you finish annotating, save your progress

**Additional Layers**

- iNaturalist Observations
- Prediction Hexagons

**Future Steps**

- Research Questions**
  - Retrain all layers when fine-tuning?
  - How to weigh annotations when retraining?
- Open Questions**
  - Collaborative living map vs individual annotations.
  - Concept of effort, how to annotate.
- Future Features**
  - Mask-off ocean or by height.
  - Display multiple species at the same time.

**References**

- [1] Cole, Elijah, et al. "Spatial implicit neural representations for global-scale species mapping." International Conference on Machine Learning. PMLR, 2023.
- [2] Lorie, Scott. (2023, September 21). Introducing the iNaturalist Geomodel [Blog post]. Retrieved from <https://www.inaturalist.org/posts/84677>