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Title

Bisque: cloud-based system for management, annotation, visualization, analysis and data mining of underwater and remote sensing imagery

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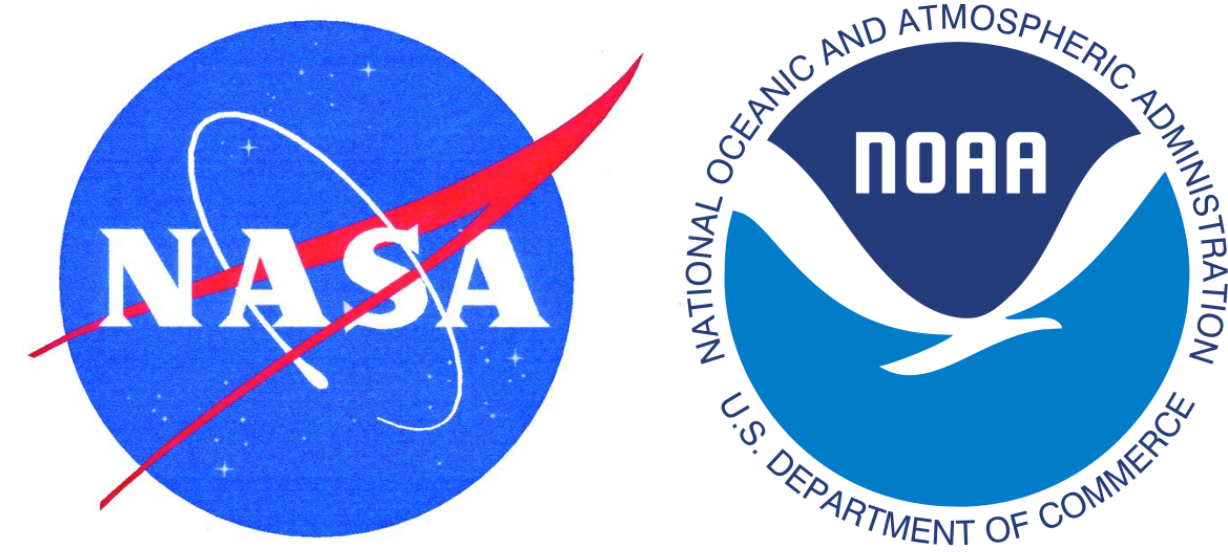
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BisQue: cloud-based system for management, annotation, visualization, analysis and data mining of underwater and remote sensing imagery

BisQue
Center for Bio-Image Informatics



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BisQue helps understand imagery

BisQue is a cloud-based system for management, annotation, visualization, analysis and data mining of underwater and remote sensing imagery and associated data. It is designed to hide the complexity of distributed storage, large computational clusters, diversity of data formats and inhomogeneous computational environments behind a user friendly web-based interface.

Our annotations

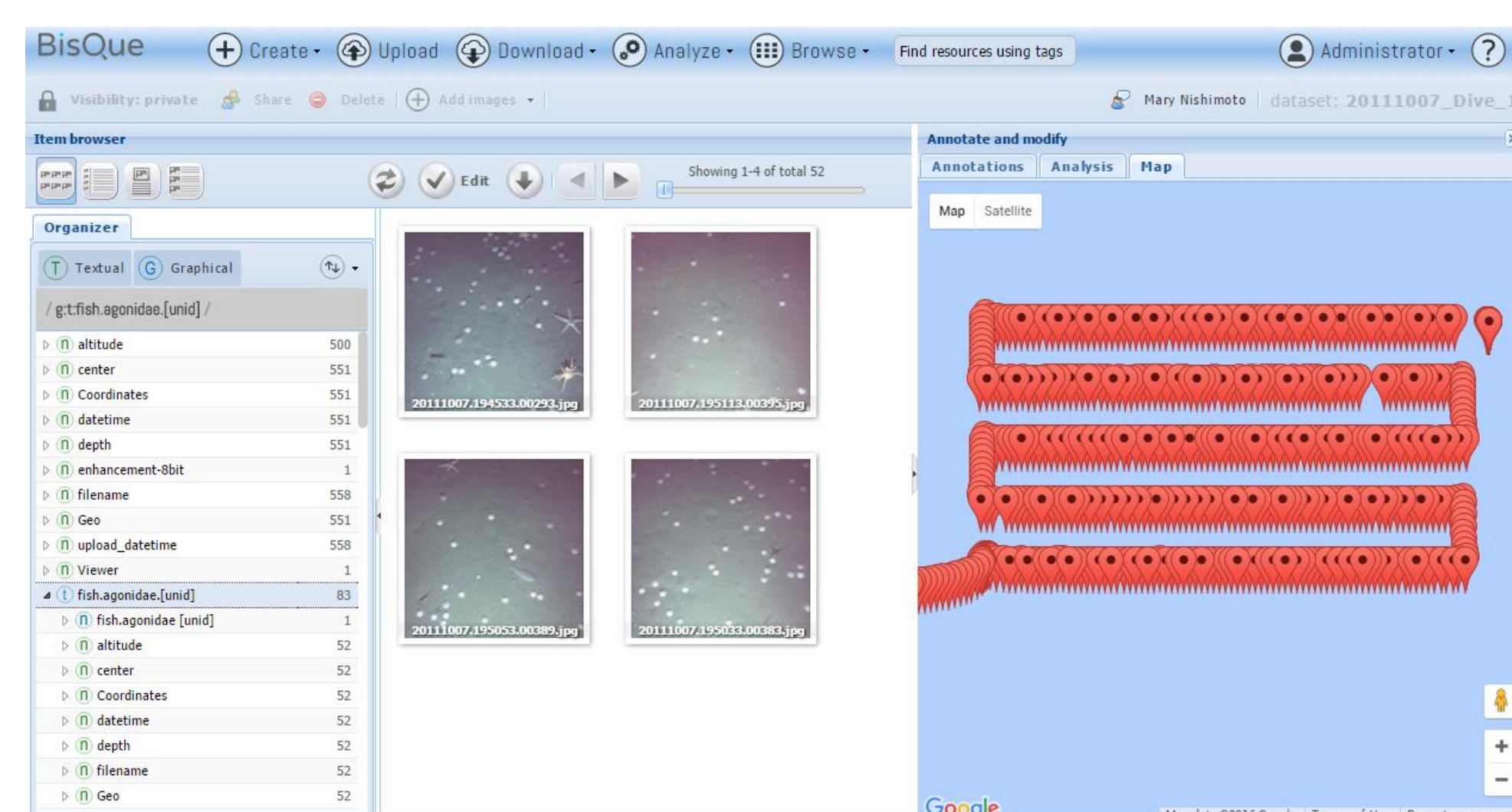
- Describe every file with attributes and relationships
- Defined by the user on the fly
- Hierarchical, textual and graphical
- Create graphs via links
- Can describe: cells in fluorescent 4D images, fish species in underwater videos and kelp beds in satellite imagery

Usage @ UCSB and CyVerse (NSF infrastructure)
2M+ images, 4M+ annotations

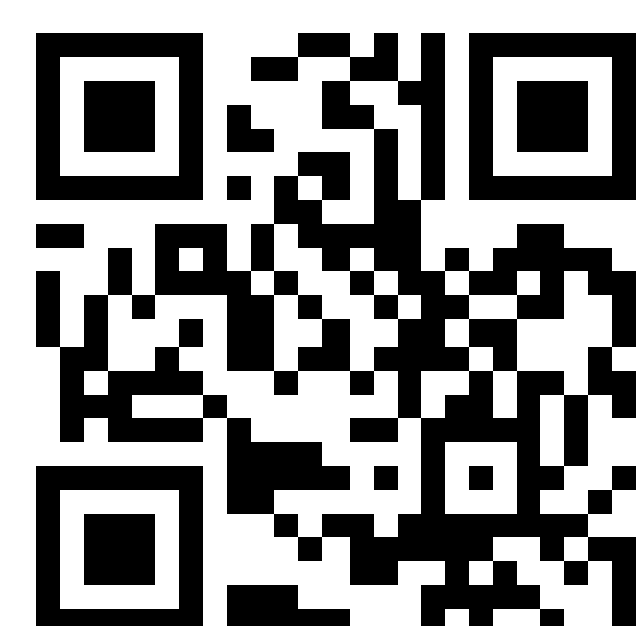
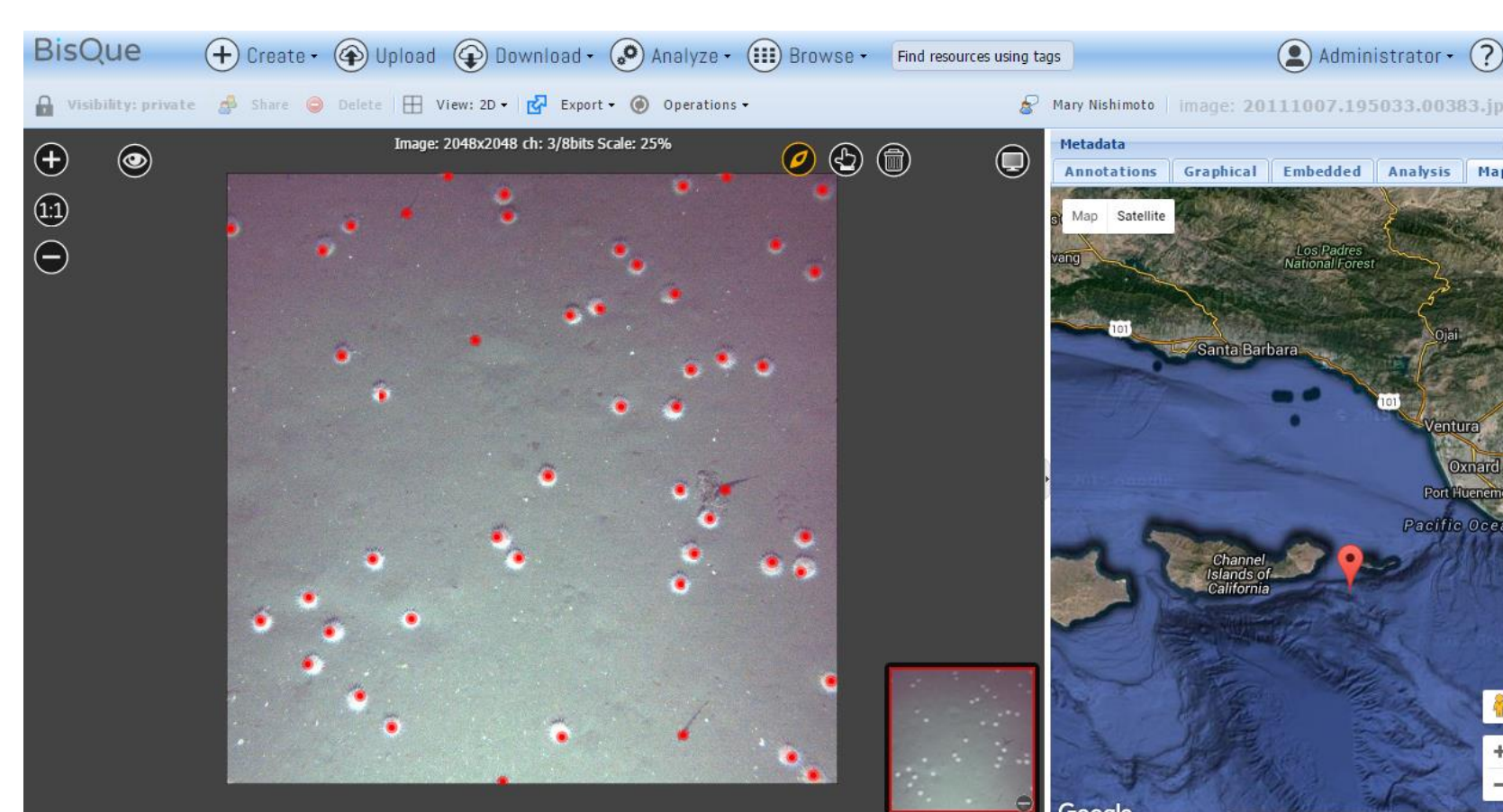
Our benthic imagery

- 30K+ samples for high frequency taxa
- ~85% of annotations belong to taxa with thousands of samples each

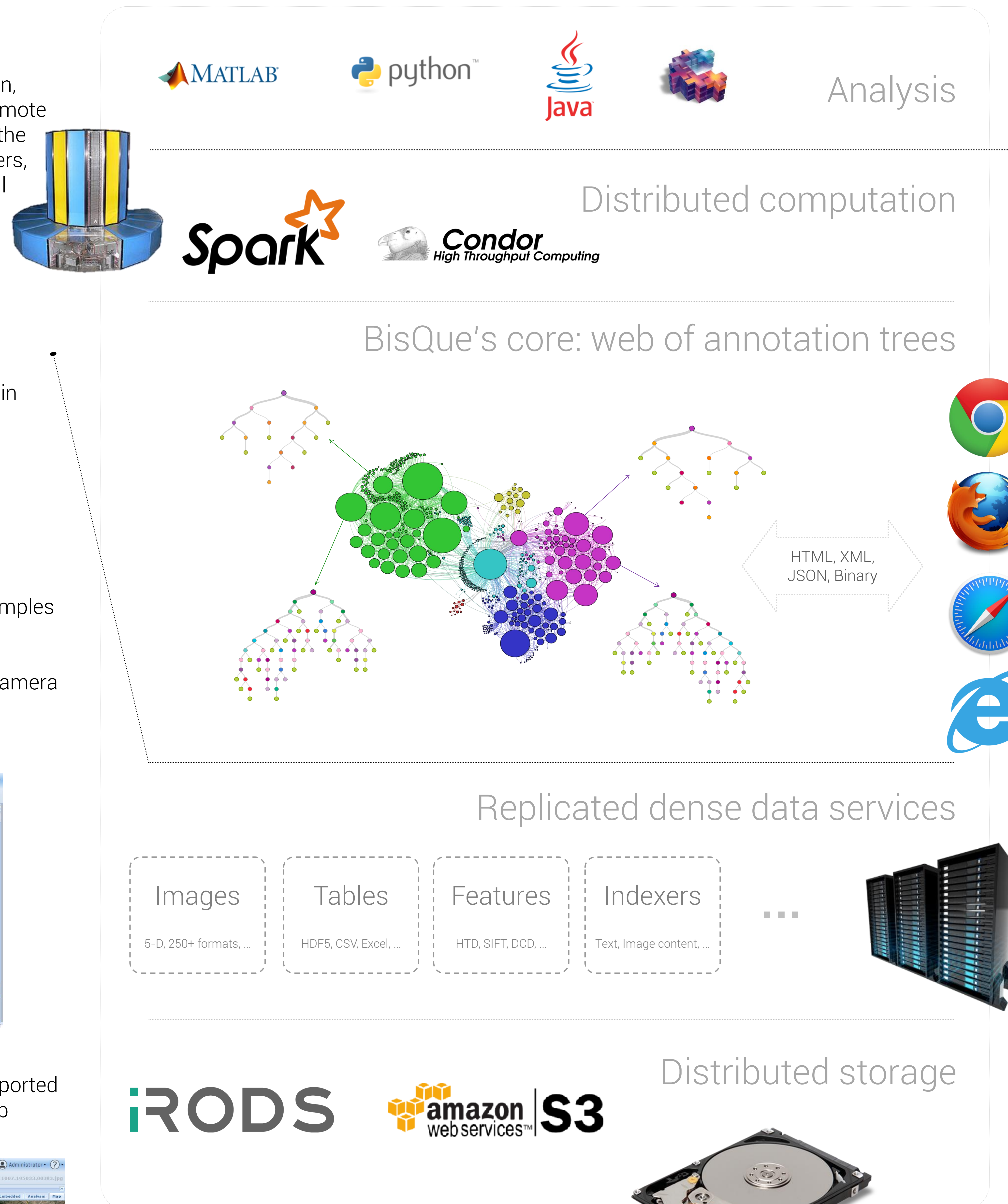
Datasets are described with user defined attributes: depth, camera orientation, temperature, localized individuals, geographical coordinates...



Annotations on orthorectified images can be dynamically exported to GIS systems and BisQue viewers can be embedded in web portals.



<http://bisque.ece.ucsb.edu>



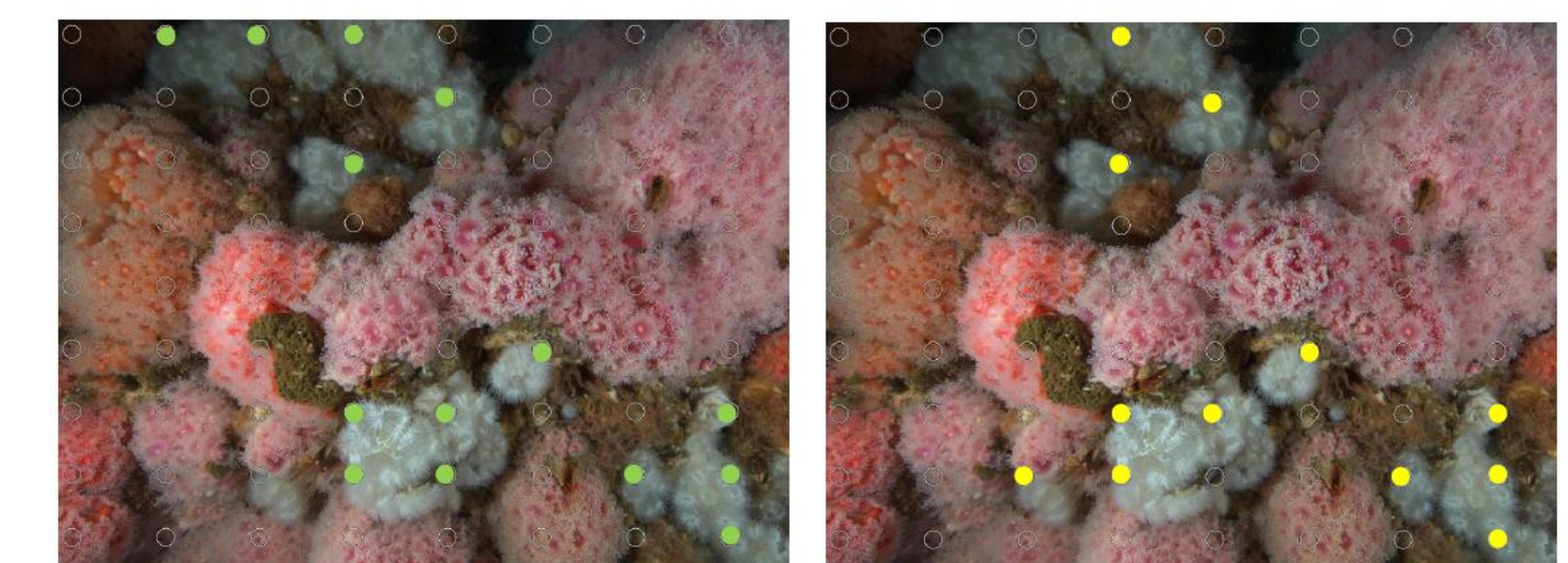
Auto classification – time saver

We are developing methods for automated identification of benthic marine organisms. Experiments with state-of-the-art classification of several thousand annotated underwater images demonstrated an overall accuracy >70% for the 15 best performing species and >85% for the top 5 species.

Machine learning methods require large training datasets (thousands of samples per species) and powerful GPU processing. BisQue will give access to these tools via a simple webpage.

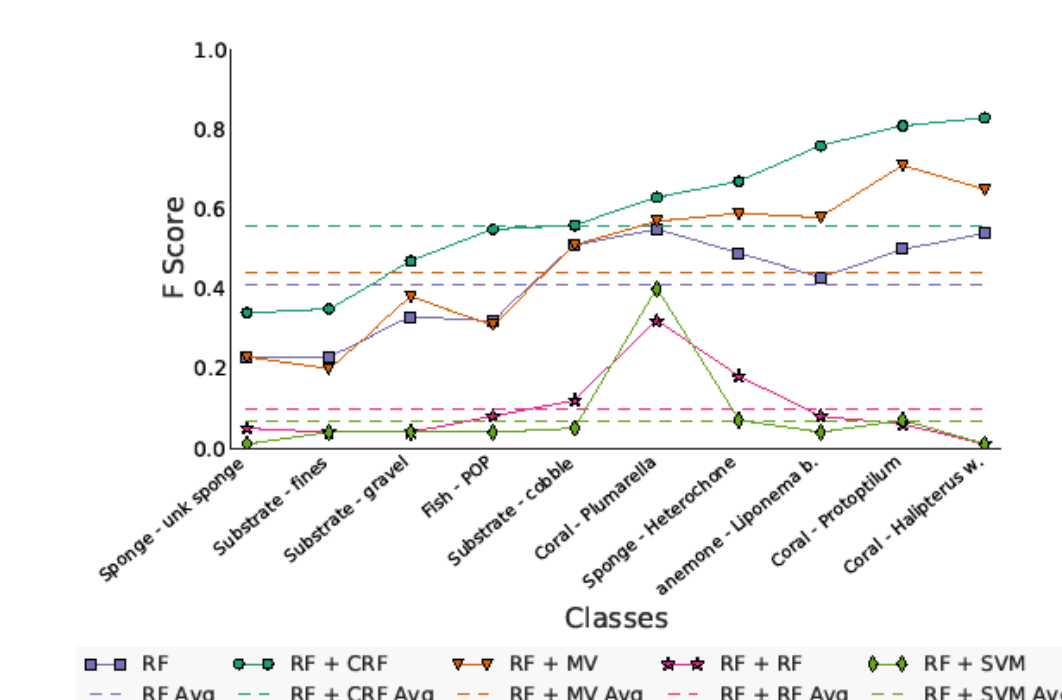
Preliminary results

Detection of anemone *Metridium senile*:



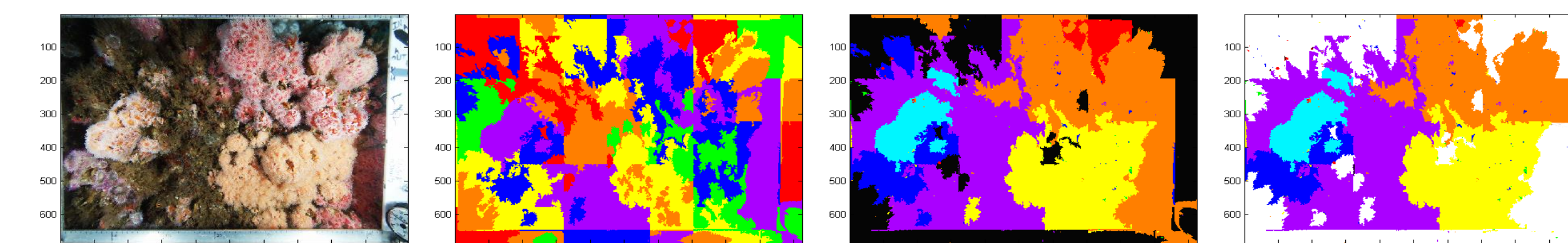
Manual Automated

Accuracy comparison for different species:



Modern classification methods demonstrate good performance for classes with many annotated samples (thousands) and may reduce manual workload by 85%. Classes with few samples will require user interaction.

Semi-Dense classification



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