Outline

- Brief Introduction
- Feature Extraction
- Classification Models: Random Forest & kNN
- Conclusion and Final Thoughts

Introduction

- We looked at tiny little things

Questions of Interest

Kratuchok's Moments

- Calculating *Kratuchok's* moments,

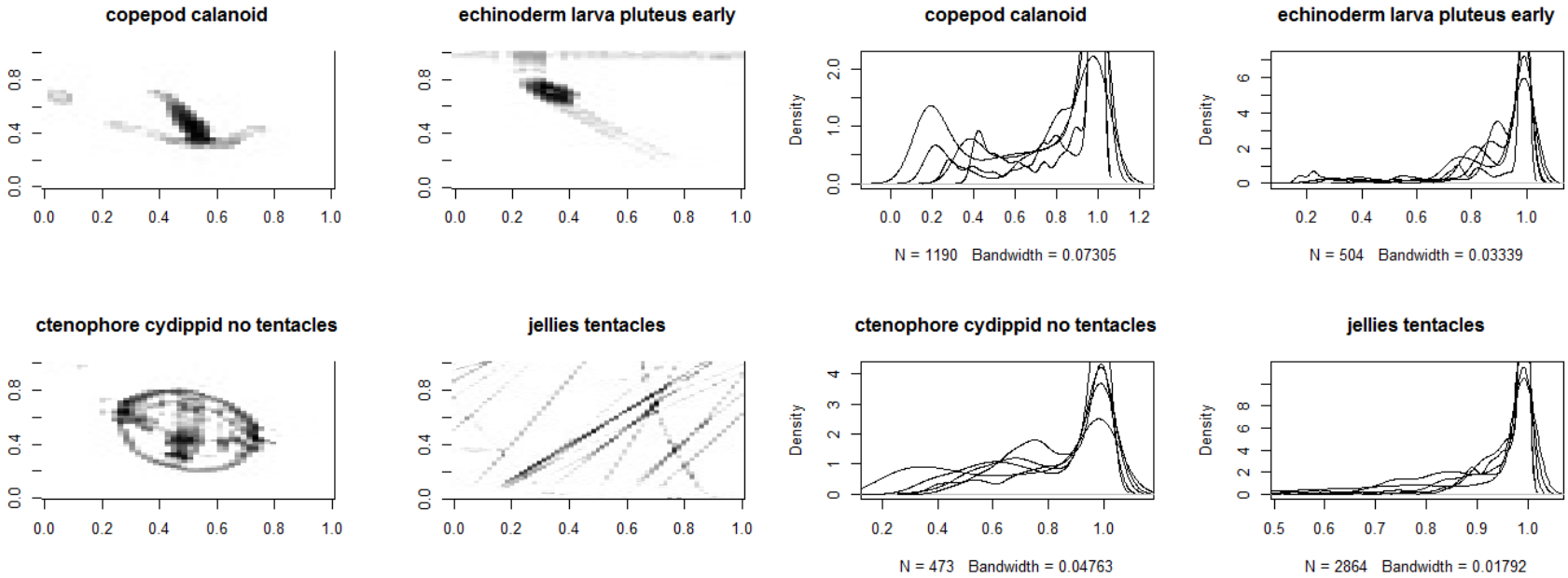
$$Q_{nm} = \sum_{x=0}^{N-1} \sum_{y=0}^{M-1} \bar{K}_n(x; p_1, N-1) \bar{K}_m(y; p_2, M-1) f(x, y),$$

where $f(x, y)$ is the pixel intensity and $(K_n(a; p, N)$ are the weighted Krawtchouk polynomials, and $n \in \mathbb{N}$ is order of the moment in the x- or y-direction.

- Kratuchok moments are invariant under scaling, rotation, and translation.

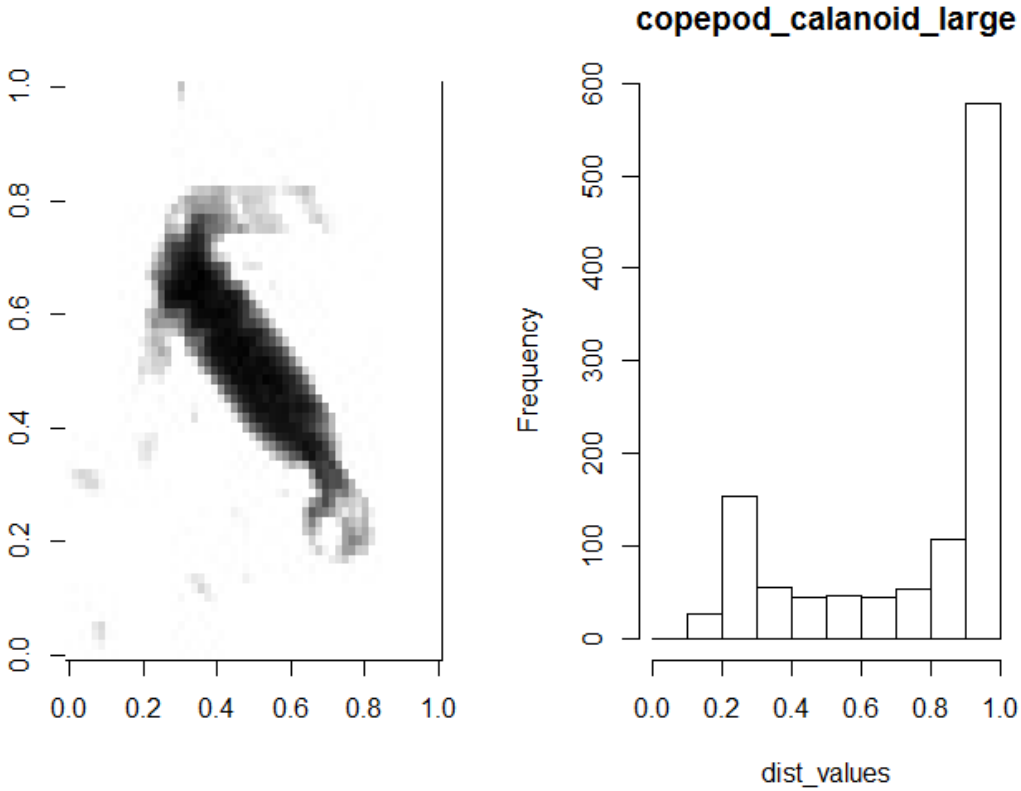
Histogram Method

- Some of species of plankton give distinct distributions of gray scale values.



Histogram Method

- The grayscale is on a [0,1] interval and we partition the interval into a width of 0.1.
- We have count the number of values that are between $[0, 0.1], [0.1, 0.2], \cdots, [0.9, 1]$.

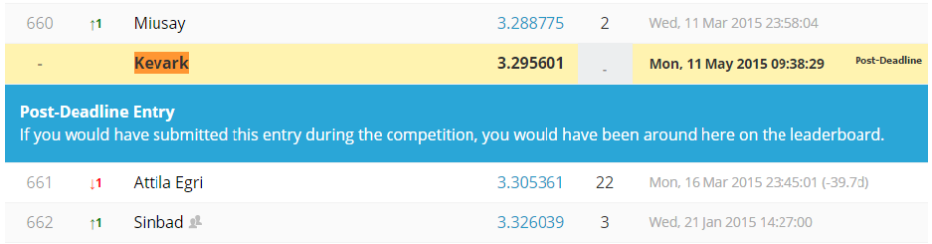


Indicio Package and kNN

- This produces a sparse, 2048 digit feature vector for each image that can then be used to calculate the Euclidean distances between different feature vectors

Kaggle Results:

- We are surprised as much as you.
- Histogram method produced a score of 3.29.

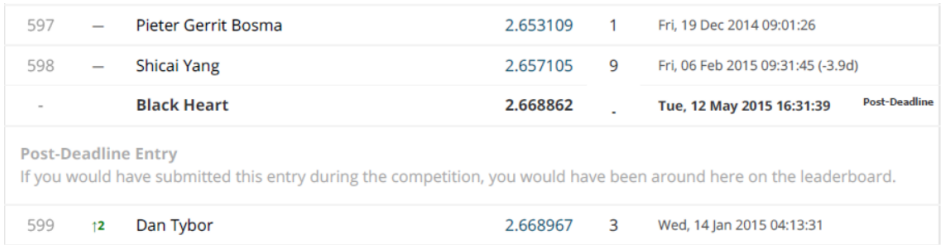


660	↑1	Miusay	3.288775	2	Wed, 11 Mar 2015 23:58:04	
-		Kevark	3.295601	.	Mon, 11 May 2015 09:38:29	Post-Deadline

Post-Deadline Entry
If you would have submitted this entry during the competition, you would have been around here on the leaderboard.

661	↓1	Attila Egri	3.305361	22	Mon, 16 Mar 2015 23:45:01 (-39.7d)	
662	↑1	Sinbad	3.326039	3	Wed, 21 Jan 2015 14:27:00	

- Combination of Histogram and Moments produced a score of 2.66.



597	–	Pieter Gerrit Bosma	2.653109	1	Fri, 19 Dec 2014 09:01:26	
598	–	Shicai Yang	2.657105	9	Fri, 06 Feb 2015 09:31:45 (-3.9d)	
-		Black Heart	2.668862	.	Tue, 12 May 2015 16:31:39	Post-Deadline

Post-Deadline Entry
If you would have submitted this entry during the competition, you would have been around here on the leaderboard.

599	↑2	Dan Tybor	2.668967	3	Wed, 14 Jan 2015 04:13:31	

Conclusions and Final Thoughts

- Apply image processing algorithms