Propeller Hunt 2

My solution is based on the final submission of Psyho from the first phase. I will only describe the modification which I have made (hoping that you will get better description of Psyho's solution by himself).

New features

The following 3 features were added:

- number of detections in the current image
- number of detections in the current bag ("bag" were defined by Psyho himself, it is a set of detections with orbital radius in the same subinterval, he was using the bags to create another features)
- shortAxisLength (feature defined in the same way as in the provided *ImageProcessingTool.java*)

Random Forest Configuration

The value of `cfg.maxNodeSize` was changed from 10 to 1, but this probably did not change the score in a significant way.

Sorting the Final Answer

In Psyho's solution, the detections were sorted simply by the result of the random forest. Since most of the images were with single propeller, in my solution of the first phase, I decided to sort the answer by image-rank as a primary key (it is described in my description from the first phase). So I tried the same approach with Psyho's code. As it showed up to have almost no effect on the provisional score, I decreased the weight of the image rank in such a way that one position in the image rank decreases the score from the random forest by 0.1 (assuming [0, 1] is the range of the score of the forest).

Overview of implementation

To add the features, several slight changes were made (e.g., passing extra arguments to some methods). Most of the changes were made in the `generateDetections()` method. To add the first two features, I added an extra loop – this is not very effective, but the time spent there was not an issue, so I did not optimize this.

The complete list of changes is visible at https://www.diffchecker.com/b45q1m1i and includes:

- commenting/removing some multi-thread code which probably was used locally by Psyho (I could not compile that locally, so I removed it);
- shifting the definition of the MV threshold from lines 1131 and 1151 of Psyho's code to the front of the code (line 18 of my code), to be able to try other values quickly; but in the end I left the value unchanged;
- some preprocessor definitions used in my code (lines 22 to 28);
- adding radiusLongitude2PixelPosition() method to the Transformer class (Psyho did not use it. In fact, also my final code does not use it. It was used to calculate some features which had no positive effect and so were removed.);
- some extra local variables used to calculate new features;
- sorting described above (lines 1586 to 1604 of my code).

Extra Notes

- My submission n. 6 got provisional score 251054.42, which was higher than my final submission (score 249737.87). But later when I resubmitted exactly the same code (submission n. 14), I only got 232872.60. I do not fully understand why. Let me know, if you know. In submission n. 6, only first two new features were added.
- I have noticed how Psyho was using imageId strings to get the linking score. It was for sure not intended for this purpose and now you probably regret you did not change these strings to something what can not be used to extract information. I tried to replace this code by my approach from the first phase, but got only similar / lower score comparing to Psyho's approach.