Rejection reasons

Rejection of false detections by a human operator (post-processing screening) may be due, but not limited to (note that in the following black = bright, white = dark, as is common in astronomy):

1. the single most common reason – a detection points to a very faint object. It cannot be distinguished from background noise (see Fig. Error: Reference source not found)

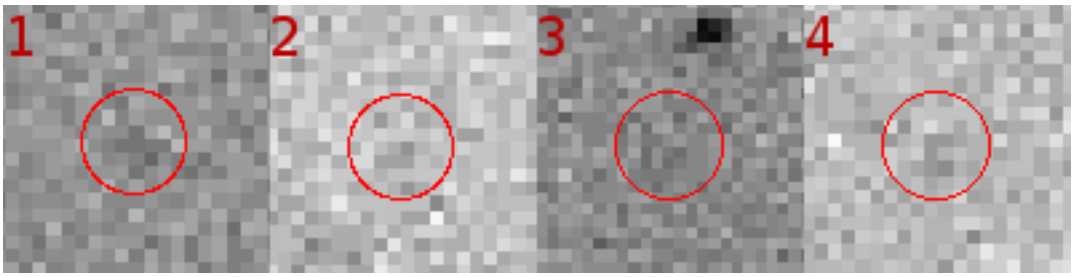

Fig. 1: This figure shows that the detection, within the set of 4 (labeled 1 to 4) images associated with the same "would-be" asteroid is non distinguishable from the background noise in any of them

2. the image may contain bad pixels which elevate the significance of noise in the immediate vicinity of the bad column, thus when a false detection goes over this bad column it reduces the number of matches to 3 giving noise an increased chance of positioning on a straight line (see Fig. 2)

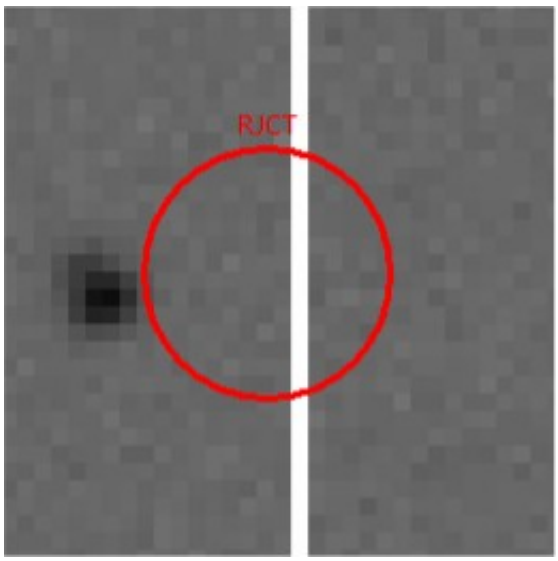

Fig. 2: Example detection near bad column pixels. Remember that white = dark

3. a detection was not visible in one of the 4 images and only 3 detections were used. The following listing is from a man made rejection file. The 703x code in the last column means that the detection was not visible in that particular image. By inspecting the magnitude of the object (<number + V> in the second last column) it can be seen that the third detection (1N0406630047) is 2 magnitudes brighter than the others, meaning roughly a brightness factor of 6 between the detections and although some variation is expected from one image to the other, a factor of this level is implausible

Part of man made rejection file illustrating rejection no. 3:

```
1N0406610047 C2012 12 02.52227 12 13 44.22 +03 00 01.5         703x
1N0406620047 C2012 12 02.52711 12 13 46.88 +02 58 26.5 18.8 V 703
1N0406630047 C2012 12 02.53054 12 13 48.75 +02 57 18.5 16.9 V 703
1N0406640047 C2012 12 02.53398 12 13 50.66 +02 56 11.2 18.5 V 703
```

4. a somewhat variable star bleed that is saturating the pixels will cause a poor centroid associated with the star, but since the centroid of the saturated pixels moves due to charge overflow, this is detected as a moving object. Considering the pixels being saturated, the object will typically be bright (brighter than magnitude 17) and show very little motion (see Fig. 3). It is important to stress here that “typical” doesn't necesarily include all possible values and you should be careful with your assumptions

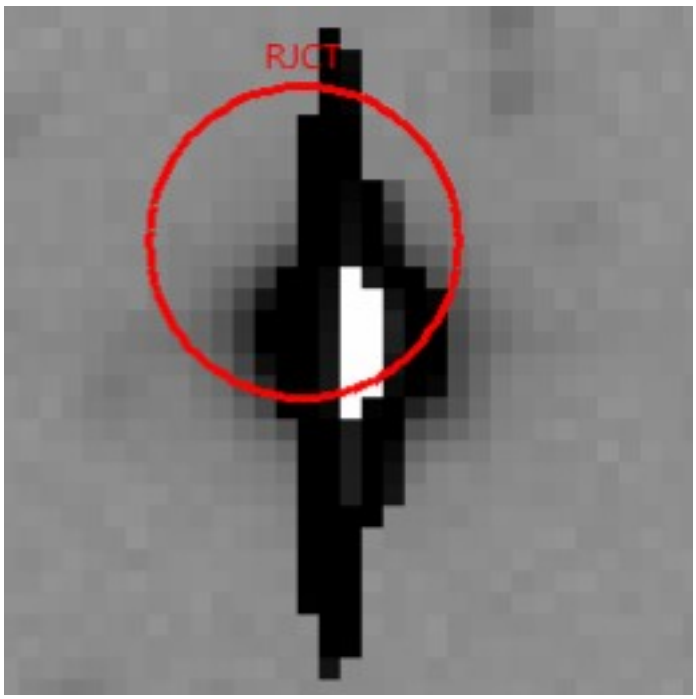

Fig. 3: Example detection of a moving star bleed

5. unwanted optical reflections (known as ghost reflections) may interfere with the detection process (Fig. 4).

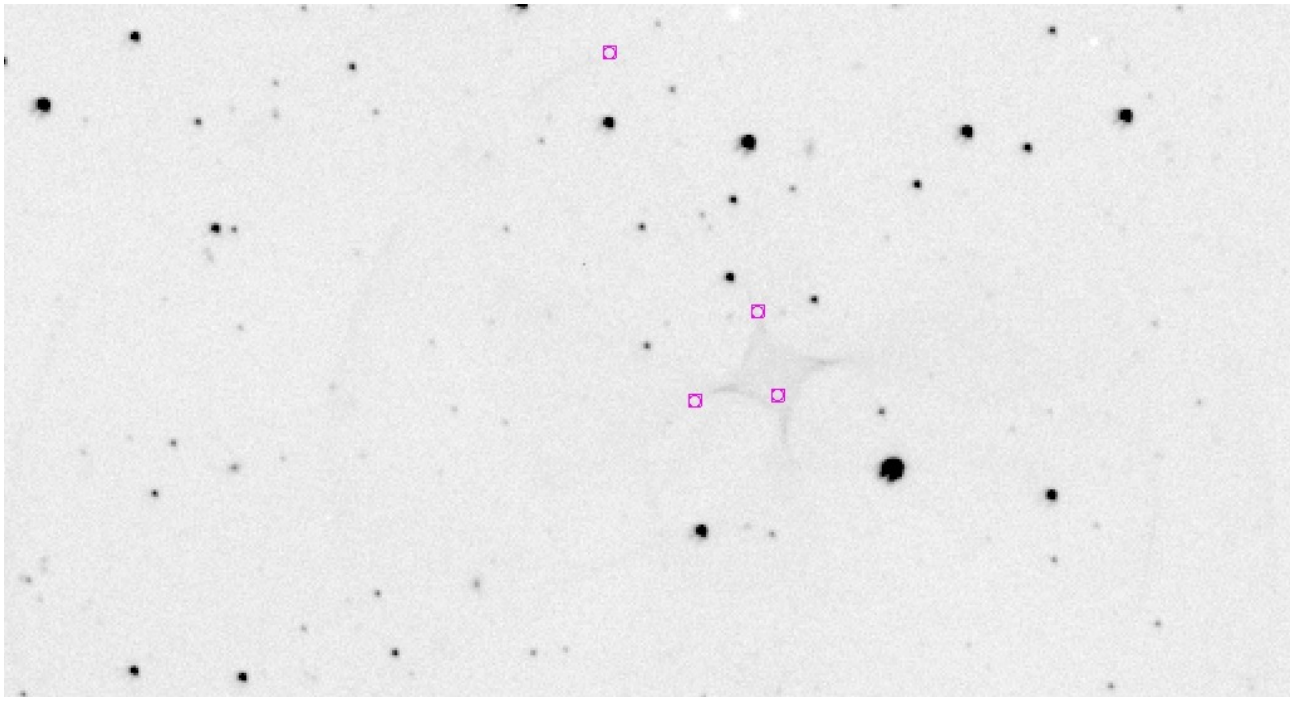

Fig. 4: Ghost image cause by unwanted reflections in the optics system. Here all the violet highlights are false detections.

6. other strange appearances like in Fig. 5.

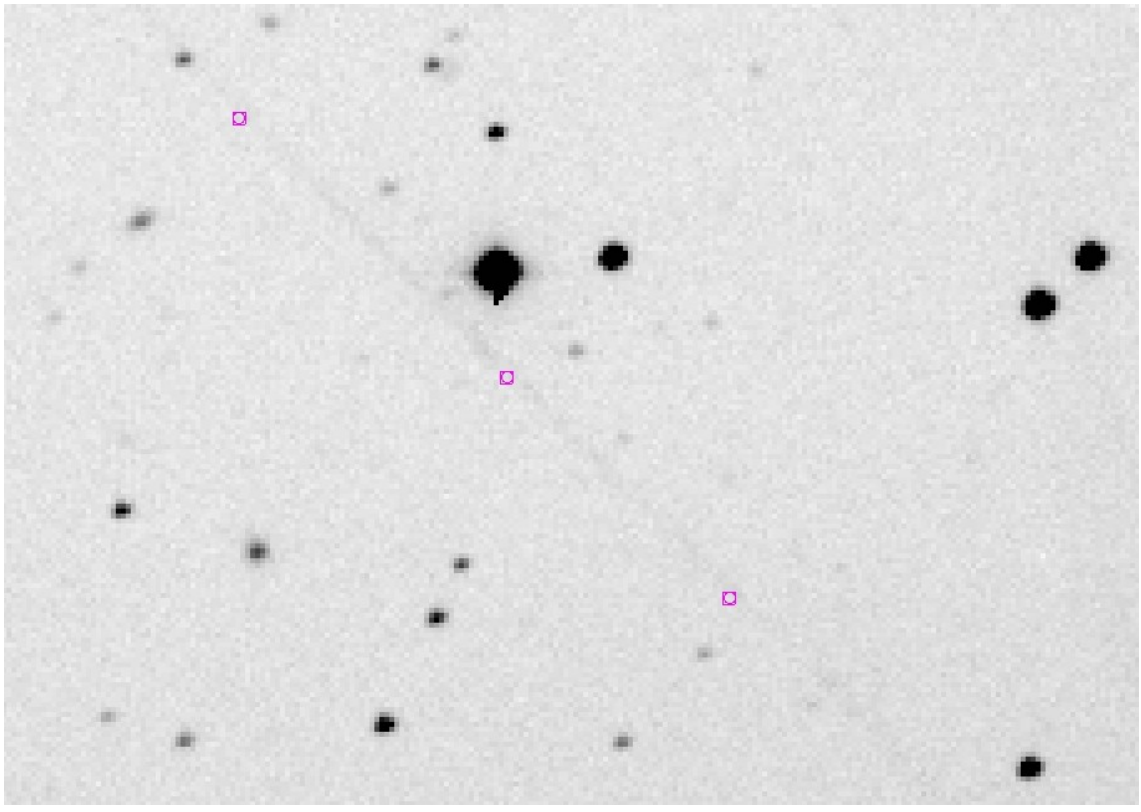

Fig. 5: The "line" traversing the image from top left to bottom right is not a real asteroid, yet based on this false indication the algorithm is fooled into thinking that there are 3 asteroids (violet highlights) aligned on a line within the portion of this one image.