Parallel processing of signals from video cameras to create still images

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A simple method to increase the efficiency of MetRec and UFO Capture.

1 Introduction

The efficiency of video software handlers is not 100 %, and is particularly low at fainter magnitudes. Although the camera captures, the software does not record. A solution would be to use the signal to create an image integrated over an interval of time. All meteors captured by the camera would then become recognizable in such images and could then be processed using "photographic" methods.

2 Number of recorded meteors

As we can see from *Table 1*, the number of video meteors is smaller than would be expected at fainter magnitudes.

Table 1 – Comparison between the number of recorded meteors.

Meteor brightness	< 1 mag	1 – 2 mag
Number of visual meteors	6225	9082
Number of video meteors	47779	10691

Based on the data for bright meteors in *Table 1*, we can see that the number of video meteors is typically 7 times higher than that for visual meteors. The ratio for fainter meteors is out of step with this, so we must either be missing fainter video meteors or have an issue with the visual meteor numbers, or a combination of both. *Figures 1 and 2* compare the magnitude distribution for video meteors (recorded by the CEMeNt / EDMONd networks), with the magnitude distributions for shower meteors and sporadics seen by visual observers.

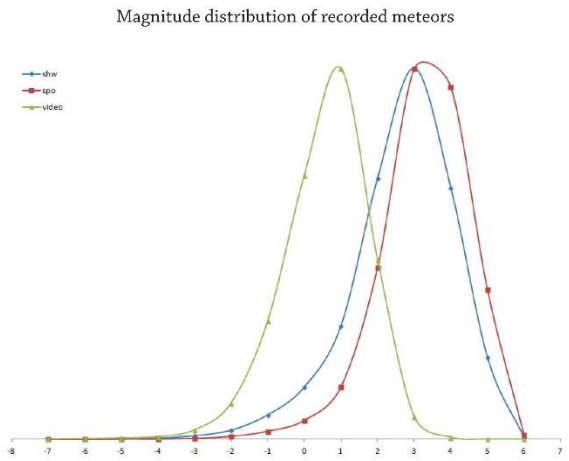

Figure 1 – Comparison of magnitude distributions for video and visual meteors.

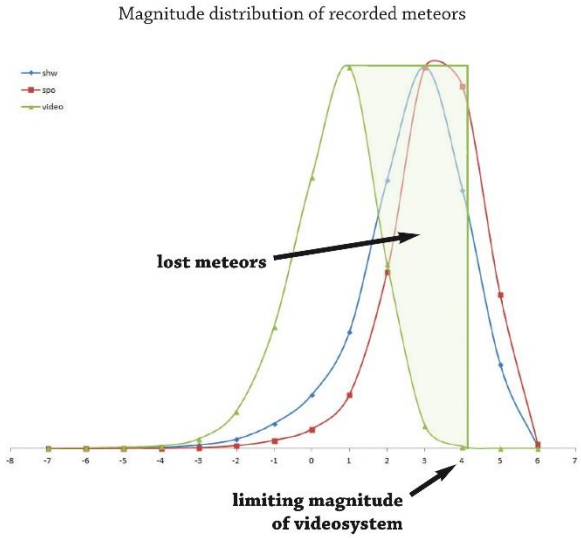

Figure 2 – The same data as in *Figure 1*, but also highlighting missed meteors above the video camera sensitivity limit.

For these reasons we decided to design a simple system to record *all* meteors within the sensitivity limits of our instruments. The principle of the system is shown in *Figure 3*.

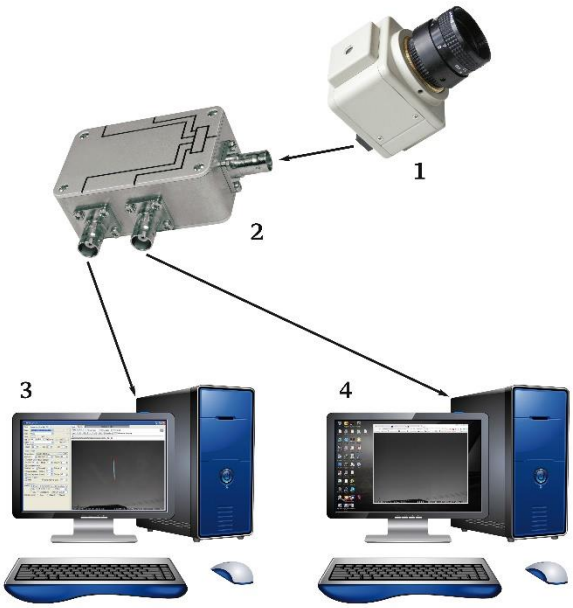

Figure 3 – Simple system to record *all* meteors: (1) camera, (2) video splitter, (3) computer with a standard system for meteor capturing, (4) computer with a system for capturing 1-minute videos.

3 Capturing procedure

- The parallel system records movies with a length of 1 minute.
- Our utility splits the video into individual frames (1500 fits files).
- The procedure then separates the individual odd and even frames, building up two separate still images (with the method „add maximum value of pixel”).
- It then saves the two images ("fits") („odd” and „even”) and deletes the processed video (processed videos can also be saved, but it would require a very large hard disk).
- Waiting for a new video file.

The whole procedure takes about 46 seconds on a good computer.

At the end of an observing session covering a whole night, we may typically have generated around 1200 (2 × 600) still images *(Figures 4a, 4b, 4c)*. These images may be used for further investigation – searching for (lost) meteors, examination of the sky characteristics (limiting magnitude, light pollution etc.).

Figure 4a – “Classical” image of a video meteor.

Figure 4b – Image of video meteor consisting only of odd frames.

Figure 4c – Image of video meteor consisting only of even frames.

Pros

- records of *all* meteors within the range of the system;
- better information about sky conditions;
- better information about the particle flux.

Cons

- additional computer (the system can also be run alongside UFO/MetRec on a single powerful computer);
- manual inspection of recorded images;
- manual processing of „new” meteors;
- extra data that may never be used.

4 Conclusion

The proposed system is simple and inexpensive, but involves additional processing. It has the capability to improve our understanding of the distribution of meteoric matter in the vicinity of Earth.

References

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