A Sign In Space discussion

How to extract the 5 signs

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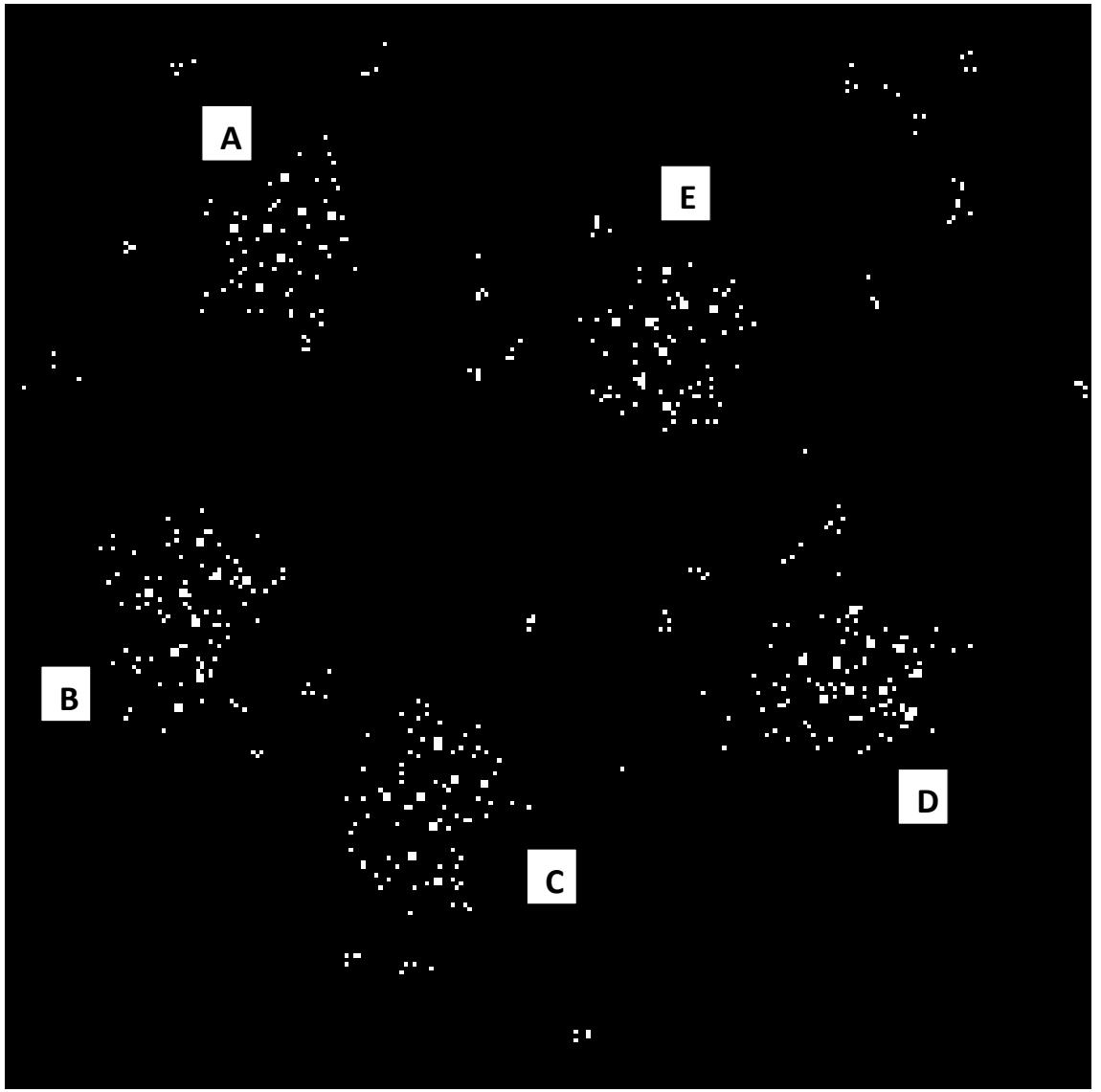
The message

This presentation address only the 65536 bits of the message section. After many attempts to further interpret the data17.bin, the most coherent for the message section still appears to be the 256x256 2d image representation.

The user community has from right after the initial decode of the radio/telemetry transmission noted that there are 5 clusters in the 2d image. They were initially labelled A, B, C, D and E.

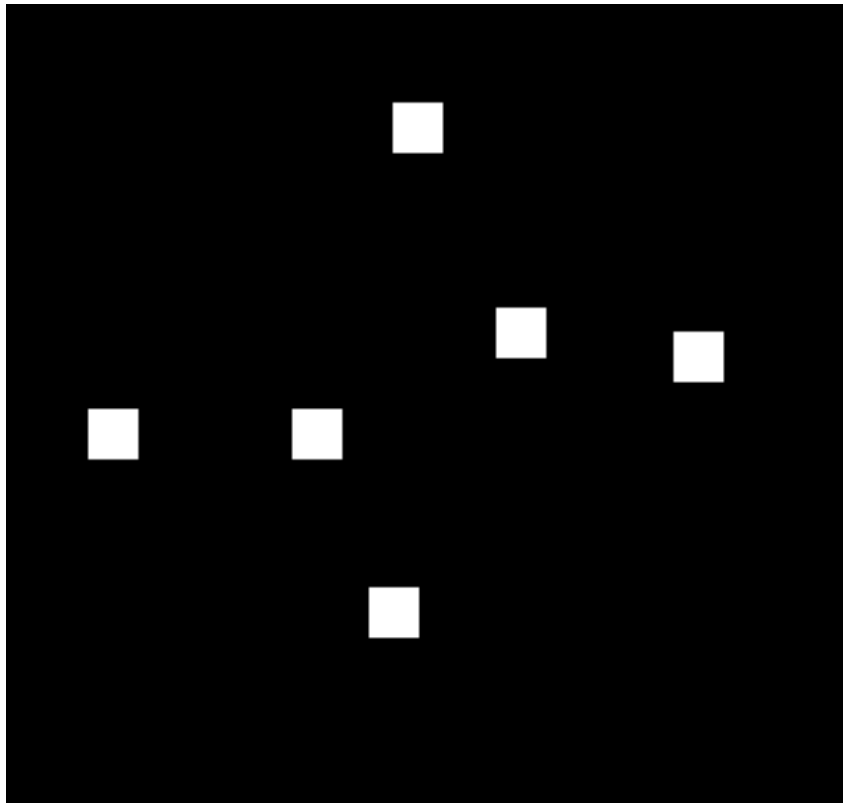


The common 2x2 blocks in each sign

The 5 signs also have 6 2x2 blocks with the exact same relative position in each sign.

This is represents a common element in all 5 signs.

Header bytes 3 and 4 have the value 40 and 65. Row 40, Column 65 is also the coordinate of the first 2x2 block in sign A.

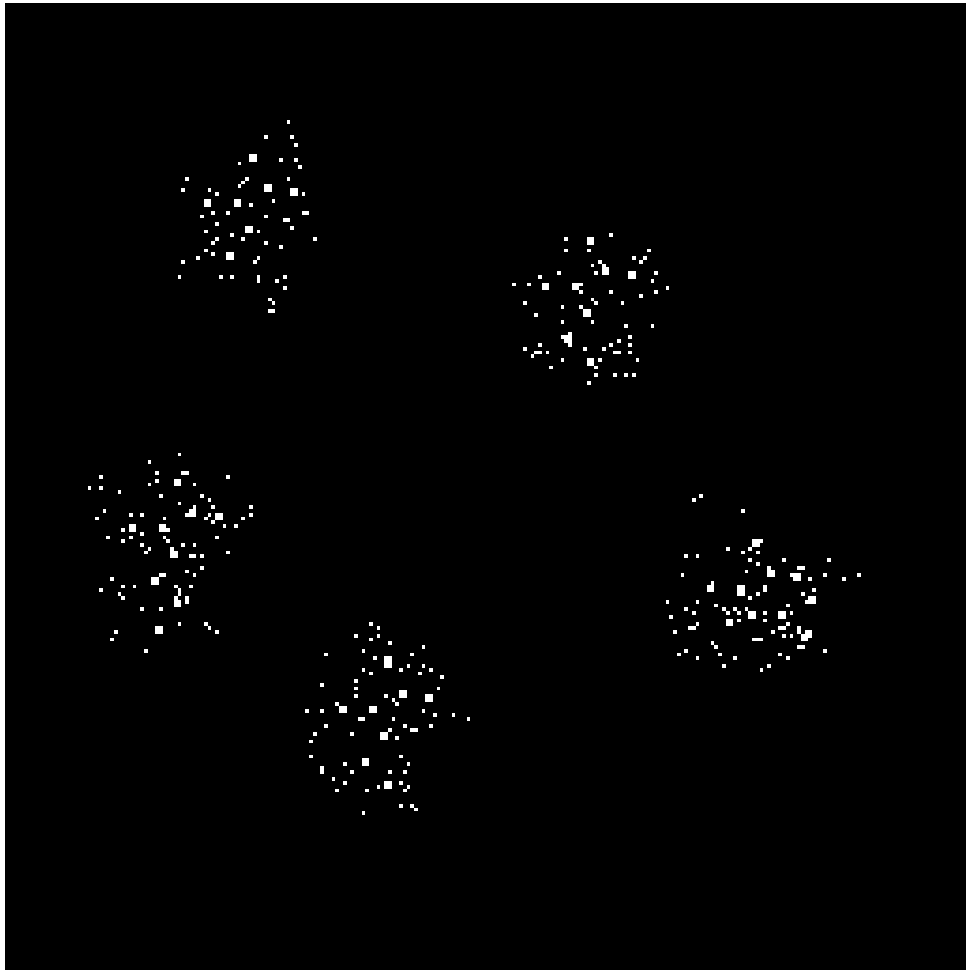


The Problem

- 1.) Are all the bits significant in the message? (i.e., are all the bits deliberate to the message or are some of the bits noise?).
- 2.) If they are all significant then the expectation is then every bit would belong to a sign but which one (could they be equivalent to the dot over an i or an ~ over a letter)? Showing the peripheral bits and the distance they are from various signs they are closest to brings the third question.
- 3.) Given the lengths a sign may be spread over then is it likely that some of the bits close to a given sign may actually be part of a different sign?
- 4.) The 5 signs have relative positions make a kernel or other transforms larger than 2x2 unworkable on the 5 signs without separating the signs into separate images. How do you separate the 5 signs so they all have the same alignment?

Illustration of the problem

courtesy of Doug Arterburn



This is just one approach of many

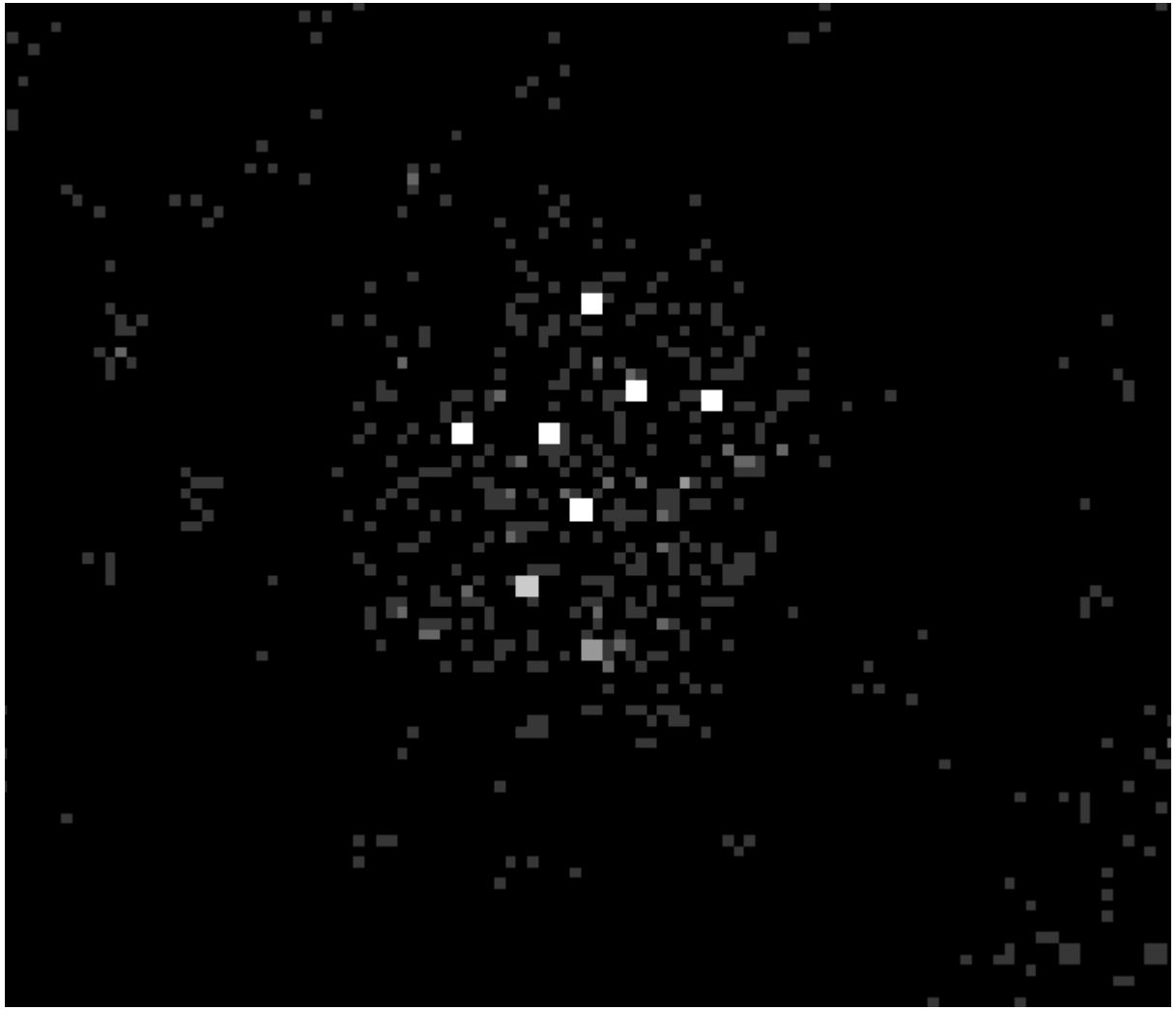
- Based the on this interpretation of the 2d image, one possibility is the 5 signs were transformed before being added into the 2d image.
- The signs were added to the 2d image at specific locations such that there was not an overlap of bits in the final 2d image.
- Each of the 5 signs may not be on the same grid alignment in the 2D image relative to the original transform.
- Some bits from one sign overlap the space of another sign in the 2d image.

Location of the signs
Uniqueness of the signs

These are (zero based with the origin in the upper left corner of the image):

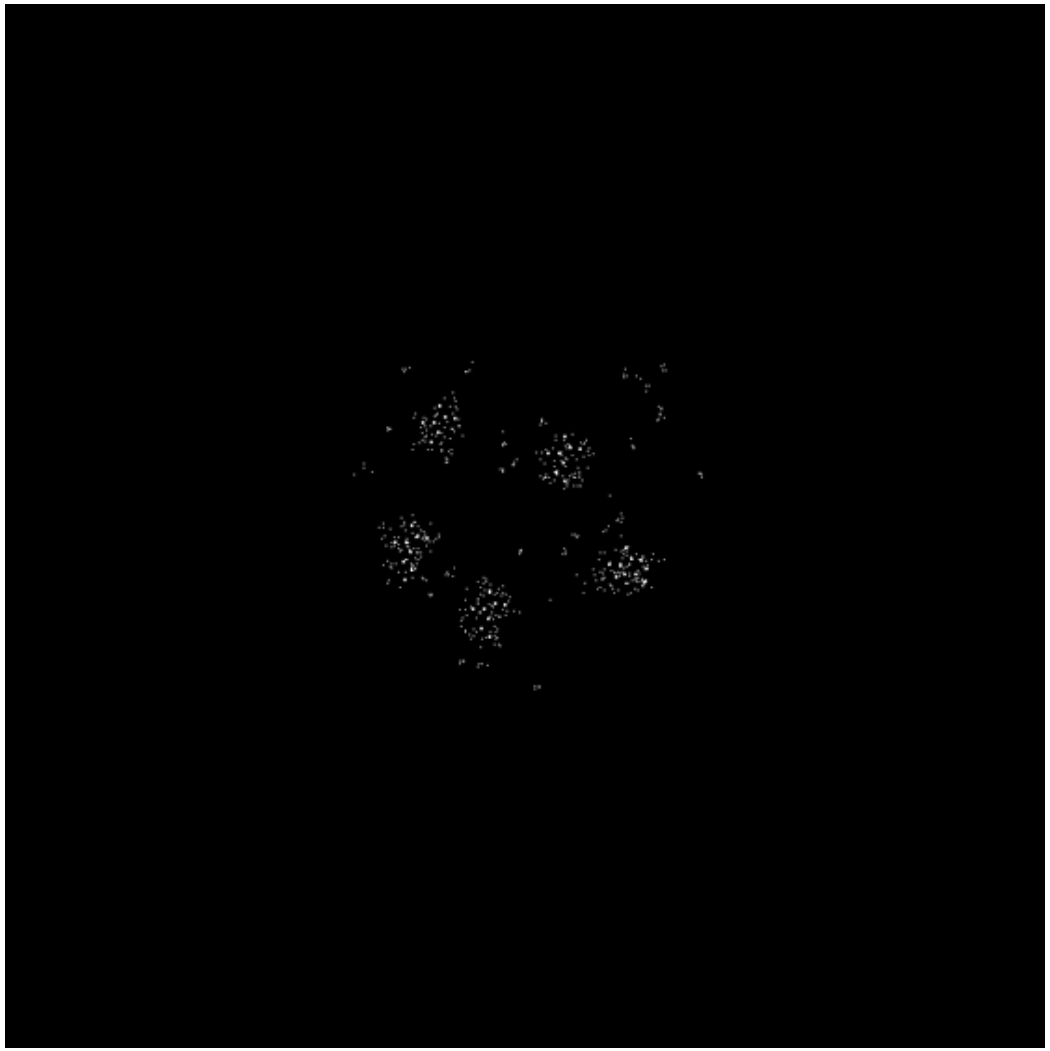
Sign A, 40V,65H x,y notation 65,40
Sign B, 126V,45H x,y notation 45,126
Sign C, 174V,101H x,y notation 101,174
Sign D, 153V,199H x,y notation 199,153
Sign E, 73V,155H x,y notation 155,73

Whn the 5 signs are isolated, aligned and summed together, one can see that there only a few common bits between the signs.



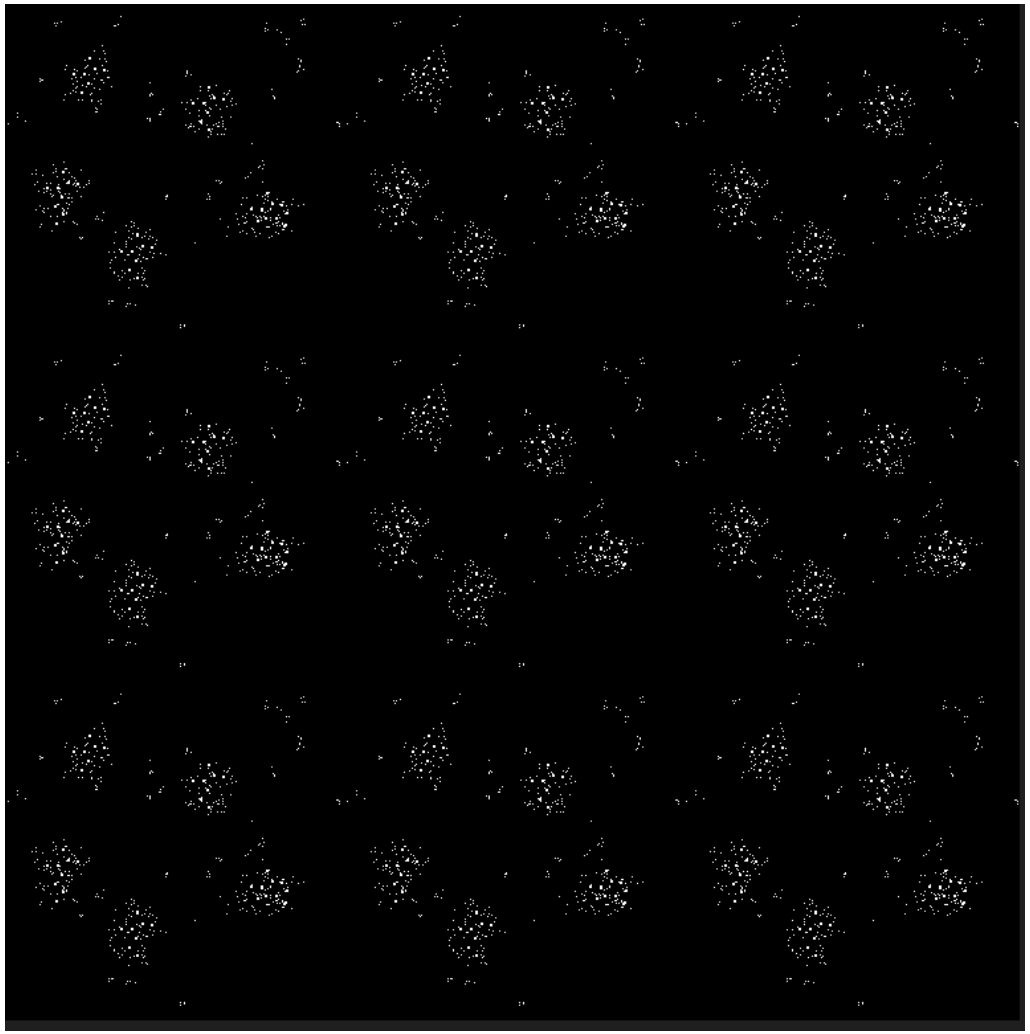
0s extension of image

Extend the original in all directions padded with 0s. The new image is 768x768 in size with the original image is in the center.



Wrapped extension of image

This assumes that the original 2d image wrapped on itself when adding the signs into the 2d image. This requires appending the 2d image to itself 3x time horizontal and 3x vertically. The new image is 768x768. The original image is still in the center.

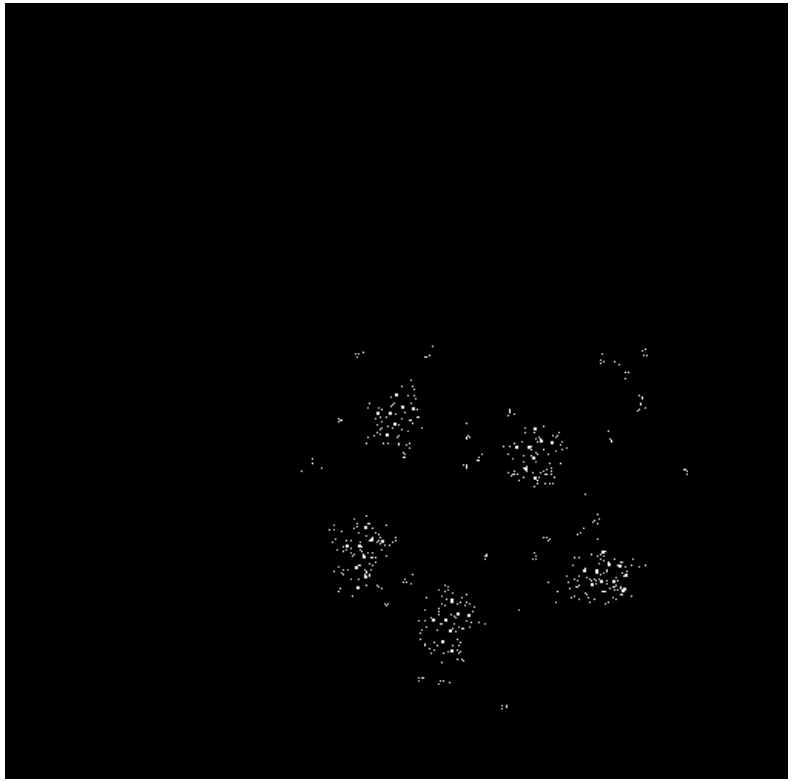


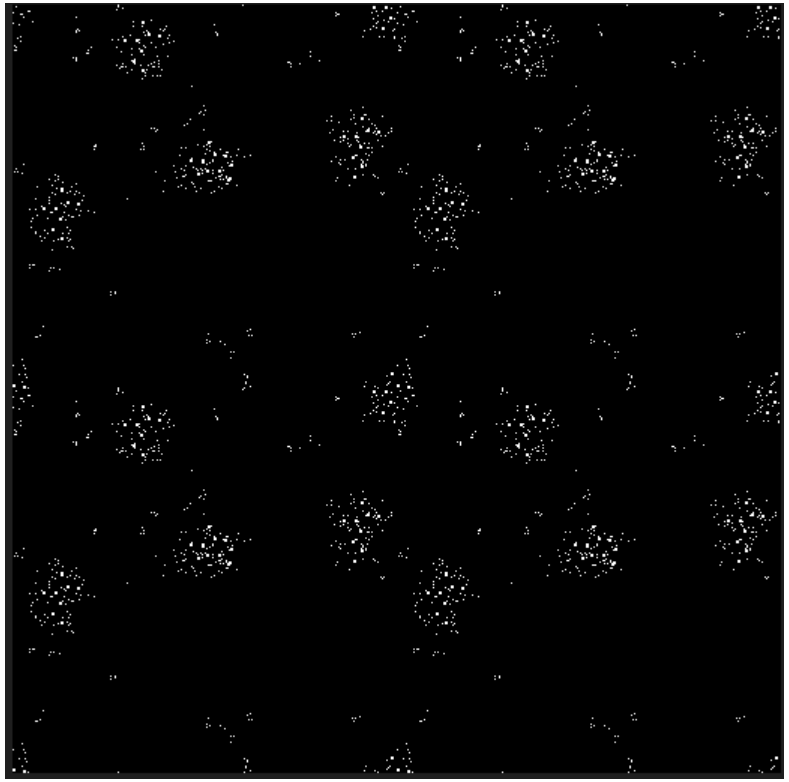
Extraction of sign aligned images

- This allows a smaller 512x512 image to be extracted and centered on a specific sign without any bit or geometry loss.
- In the extraction process one must decide what the center alignment of a sign is used. A couple of alignments to try are (using x,y zero based notation).

Sign	Left topmost corner of first 2x2 block in a sign	Center of the common 6 2x2 blocks in a sign
A	65,40	65,51
B	45,126	45,137
C	101,174	101,185
D	199,153	199,164
E	155,73	155,84

Example of results





- These are 512x512 for sign A using 65,40 as the origin.
- Smaller image sizes can be extracted but may not contain all the bits belonging to a sign

Questions to resolve

- **What to select the origin in a sign to use as the center of the image.**
- **What transform to apply to the image.**
- **What if any information is also to be derived from the relative position of the 5 signs.**
- **Smallest image that contains a full sign.**

Reference materials

- A new thread will be created ‘5 signs’
- This presentation and paper will be posted there
- Some initial BMP files will be posted there
- Other formats fiwll be posted upon request
- I know most already have there own software to do this kind of operation. The thread ‘basic tool for examining the message’ has a link to github were I also have posted a windows app and source that can perform the image extractions suggested here.