invention, the preprocessing apparatus may not be included in the system and the analysis may be performed on the unfiltered SAR image using processes described above, such as with matched filters and/or neural networks which are employable for analyzing un-filtered images.

Once the image preprocessing is complete, the SAR image may then be moved to the mover processor apparatus **708** which is configured to detect and identify movers. Additional processing may include determining characteristics of the movers such as velocity and direction. In the configuration of the system shown in FIG. **8**, the mover processor **708** employs matched filters in order to detect and identify movers in the images for each time frame. In connection with mover processor **708** is the signature database **710** which includes all the matched filters which have been calculated in order to analyze the image. As was discussed above, series of matched filters may be created to filter for certain types of vehicles at certain orientations. Once the matched filters are employed to analyze the image, the mover identification velocity, and direction information may be output in a desired format.

In order to better understand the operations of the SAR processing system **700**, provided in FIG. **9** is a flow chart which describes in detail the processes performed in mover identification when using a matched filter system. This flow chart assumes that a system user has decided to further analyze a SAR image for the detection of movers. As an initial step **804**, one or more preprocessing functions may be performed on the SAR image. As described above, each pre-processing step may include various types of filtering, clutter detection, and streak detection. This preprocessing step may also be performed as an initial mover check to determine if additional processing needs to be performed on the particular image. If at step **806** determination is made that additional processing will be performed on the image, at step **810** the first step in the analysis will begin by accessing a database which includes the previously stored mathematically generated matched filters.

At this point, the matched filters will be retrieved and employed to analyze each of the images to filter for certain types of movers. If during the analysis processes at step **814** a match is identified, the information associated with the matched filter will provide an indication of the type of mover. Things which may be determined by finding a match include the type of mover and its orientation relative to the collector. A determination that may then be made at step **818** as to whether a particular mover has been identified in a previous time frame. If the mover had been previously identified, at step **820** its previous position may be overlaid with the position identified in the current time frame to calculate a direction of movement between time frames.

As the system cycles through the various matched filters, it will perform an analysis of each. After the completion of a particular process, the next filter will be accessed in memory and used in analyzing the SAR image. Once all of the matched filters have been accessed and used to analyze the SAR image, the process is complete. At this point the SAR image may be further processed to include either a marking to indicate a mover, or if enough energy has been collected, an actual rendering of the mover.

The embodiments described above are for exemplary purposes only and are not intended to limit the scope of the present invention. Various adaptations, modifications and extensions of the embodiment will be apparent to those skilled in the art and are intended to be within the scope of the invention as defined by the claims which follow.

What is claimed is:

1. A method of identifying a moving object in a synthetic aperture radar (SAR) image of a region of interest, comprising:

establishing a plurality of receive phase centers for a SAR image collector;

obtaining a SAR image using the plurality of receive phase centers; and

detecting in the SAR image a signature indicative of a moving object in the region of interest, wherein the signature indicative of a moving object in the SAR image is detected as a function of image collection time.

2. A method according to claim **1**, wherein the signature comprises a plurality of low intensity points generated through use of the plurality of receive phase centers in the SAR image collector.

3. A method according to claim **2**, wherein the plurality of low intensity image points comprise two categories which include category-1 artifacts and category-2 artifacts, wherein the category-1 artifacts being actual images of movers and the category-2 artifacts being extraneous points.

4. A method according to claim **3**, wherein the category-1 artifacts are formed as a combination of a plurality of received pulses all originating from a common transmitted pulse, and the category 2 pulses being formed as a combination of a plurality or received pulses each originating from a different transmitting pulse.

5. A method according to claim **2**, wherein each of the low intensity points includes at least one of:

a unique impulse response (IPR) shape, a unique IPR orientation, and azimuthal aliasing.

6. A method according to claim **5**, wherein the reading step comprises:

determining the unique orientation of a category-1 IPR in the SAR image based on a time-since-collection-start.

7. A method according to claim **5**, wherein the determining step comprises:

computing a range direction of the category-1 artifacts associated with a given time-since-collection-start, and then filtering to retain only those IPRs with the associated range direction, thereby recovering only the category-1 artifacts associated with the given time-since-collection-start.

8. A method according to claim **5**, wherein the reading step includes placing small visible dots in the SAR image at the centers of the category-1 IPRs.

9. A method according to claim **1**, wherein said step of detecting comprises transforming the SAR image to a alternative domain which enhances the detection of the signature in the SAR image.

10. A method according to claim **9**, wherein the filtering step further comprises pre-filtering the SAR image using a spatial filter to obtain a pre-filtered image containing only low-intensity images.

11. A method according to claim **10**, wherein the pre-filtering comprising:

identifying a shape model for a low-intensity image, the shape model being based on an impulse response (IPR) form for a low-intensity received pulse;

determining the range direction of a plurality of low-intensity pulses associated with a predetermined time-since-collection start; and

filtering the plurality of low-intensity pulses to retain low-intensity pulses having the associated range direction.