CLAIMS:

1. A tracking system for constructing pictures of tracks of moving targets on a scene from electro-optical (EO) detections, the tracking system comprising:

at least one EO sensor configured to provide EO detections in the form of images of the moving targets on the scene; and

an EO tracker arranged downstream of said at least one EO sensor, and configured to construct pictures of the tracks of the moving targets from the EO detections, the EO tracker comprising:

a pre-processing system configured to receive, sequentially in time, the EO detections of the moving targets and to locate the moving targets on a world map by geo-referencing, so as to provide location coordinates of the moving targets and errors for each coordinate;

a candidate track selection system arranged downstream of the pre-processing system, said candidate track selection system configured to find at least one candidate track that can be associated with a current EO detection and/or to generate an indication that no candidate tracks are found;

a track initializing module coupled to the candidate track selection system, and configured to receive the current EO detection from the candidate track selection system and to initialize a new track from the current EO detection upon receipt from the candidate track selection system;

an assigning system arranged downstream of said candidate track selection system, and configured to assign the current EO detection to the candidate tracks provided by the candidate track selection system and/or to initiate a new track for the current EO detection;

a data updating system arranged downstream of said assigning system and track initializing module, said data updating system configured to update the candidate tracks after the assigning, and to generate an ambiguity set of tracks and an exclusion set of tracks;

a picture providing system arranged downstream of the data updating system, and configured to receive the ambiguity set and the exclusion set for each element of the ambiguity set from the data updating system, to generate a

picture by excluding the corresponding exclusion set from a desired element of the ambiguity set, and to calculate a picture score of the produced pictures;

a tracker database arranged downstream of the data updating system and coupled to the candidate track selection system, the tracker database configured to store the updated tracks constructed by the data updating system and to provide the stored tracks to the candidate track selection system; and

a maintenance system coupled to the tracker database, and configured to delete obsolete tracks in the tracker database.

2. The tracking system of claim 1, wherein the data updating system includes:

a coordinate update module configured to update each track candidate by sequentially calculating updated coordinates, and to update geographical location of the candidate tracks to include the current EO detection;

an ambiguity generator arranged downstream of the coordinate update module, and configured to generate an ambiguity set of tracks; and

an exclusion generator arranged downstream of the ambiguity generator and configured to generate an exclusion set for each element of the ambiguity set of tracks.

3. The tracking system of claim 2, wherein said ambiguity set of tracks includes all alternatives for creating updated tracks to include the current EO detection and/or for starting a new track from the current EO detection.

4. The tracking system of claim 2, wherein the ambiguity generator is configured to calculate an ambiguity element score for each element of the ambiguity set of tracks.

5. The tracking system of claim 1, wherein the picture providing system operates sequentially in time for each current EO detection, by using the ambiguity sets and the exclusion set for each element of the ambiguity sets which were constructed up to the current time.

6. The tracking system of claim 1, wherein the picture providing system operates periodically in time with a predetermined time period.

7. The tracking system of claim 1, wherein the picture providing system operates periodically after each N consequently received detections, where N is a predetermined number larger than 1.

8. The tracking system of claim 1, further comprising a comparing system arranged downstream of the picture providing system, the comparing system configured to

receive current pictures and to compare these pictures with the previous in time pictures.

9. The tracking system of claim 1, further comprising:

a plurality of electro optical (EO) sensors operating simultaneously; and

a sorting system arranged downstream of said plurality of the EO sensors and upstream of the EO tracker, the sorting system configured to check a validation of EO detections provided by the EO sensors to find valid EO detections, and to sort the valid EO detections obtained from the EO sensors according to their detection time.

10. The tracking system of claim 1, wherein the EO tracker further includes a classification system arranged downstream of the pre-processing system and upstream of the candidate track selection system; the classification system configured to identify at least one classification parameter of each moving target from the image provided by said at least one EO sensor, and to classify the moving targets.

11. A tracking method for constructing pictures of tracks of moving targets on a scene from electro-optical detections, the tracking method comprising:

providing EO detections in the form of images of the moving targets on the scene; and

constructing pictures of the tracks of the moving targets from the EO detections, the constructing of the pictures comprising:

receiving, sequentially in time, the EO detections of the moving targets and locating the moving targets on a world map by geo-referencing, so as to provide location coordinates of the moving targets and errors for each coordinate;

finding at least one candidate track that can be associated with a current EO detection or indicating that no candidate tracks are found, and initializing a new track from the current EO detection;

assigning the current EO detection to the candidate tracks and/or to initiate a new track for the current EO detection;

updating the candidate tracks after the assigning by calculating updated coordinates, storing the updated tracks, and updating a geographical location of the updated tracks to include the current EO detection;

generating an ambiguity set of tracks including all alternatives of the updated tracks associated with the current EO detection and calculating an ambiguity element score for each element of the ambiguity set of tracks;

generating an exclusion set of tracks for any desired number of elements of the ambiguity set of tracks, the exclusion set for an element of the ambiguity set including all excluded tracks in said element of the ambiguity set;

receiving the ambiguity set and the exclusion set for each desired element of the ambiguity set and generating the pictures of the tracks, the generating of the pictures comprising excluding the excluded tracks from the desired elements of the ambiguity set to obtain a non-conflicting ambiguity set including only non-conflicting tracks for the current EO detection in each desired element of the non-conflicting ambiguity set.

12. The tracking method of claim 11, wherein assigning of the current EO detection to a candidate track includes computing likelihood of association of the current EO detection with the candidate track to provide an associated track.

13. The tracking method of claim 11, wherein the assigning of the current EO detection to the candidate track is carried out by using a Maximum Likelihood filter.

14. The tracking method of claim 11, comprising deleting obsolete tracks.

15. The tracking method of claim 11, wherein said generating of the pictures of the tracks includes:

selecting an element from the ambiguity set having a highest ambiguity element score, generating a picture by excluding the corresponding exclusion set from the element, the picture including a non-conflicting ambiguity element that includes only non-conflicting tracks for the current EO detection, and calculating a picture score of the picture;

selecting another element from the ambiguity set having the ambiguity element score smaller than the ambiguity element score of the previous element, generating another picture by excluding the corresponding exclusion set from said another element, and calculating a picture score of said another picture;

performing the selection of the elements from the ambiguity set, generating the pictures and calculating the picture scores of the generated pictures for as many elements of the ambiguity set as desired;

selecting the picture having the greatest picture score from the pictures generated above; and

displaying the picture having the greatest picture score.

16. The tracking method of claim 15, further comprising comparing, sequentially in time, a current picture having the greatest picture score with the previous in time picture having the greatest picture score.

17. The tracking method of claim 16, wherein the comparing the current picture with the previous picture includes updating the current picture by omitting the old tracks which become obsolete, marking the new tracks, and marking the hidden tracks.

18. The tracking method of claim 11, wherein the receiving of the ambiguity set and the exclusion set for each desired element of the ambiguity set is carried out sequentially in time for one detection in N subsequent EO detections, where N is the predetermined number larger than 1.

19. The tracking method of claim 11, wherein the providing of the EO detections is performed from a plurality of electro optical (EO) sensors, and wherein the method includes sorting the EO detections obtained from said plurality of the EO sensors according to their detection time before said constructing of the pictures of the tracks of the moving targets.

20. The tracking method of claim 11, comprising identifying at least one identification parameter of each moving target from the image, and providing classification of the moving targets before said constructing of the pictures of the tracks of the moving targets.