CLAIMS

1. A system, the system comprising: a processor and memory circuitry (PMC), wherein the PMC is operative to:

obtain first position data informative of positions of first marine objects, wherein the first position data is obtained based on at least one image acquired by a given imaging device of a given marine vessel;

obtain second position data informative of positions of second marine objects, wherein the second position data is obtained based on data acquired by at least one sensor that is not an imaging device and that is different from the given imaging device, wherein at least some of the first marine objects are the same as at least some of the second marine objects;

for each out of a plurality of marine objects of the first marine objects, determine that the respective marine object and a marine object of the second marine objects correspond to a same marine object acquired respectively by the given imaging device and the at least one sensor, wherein the PMC is further operative to:

obtain first data informative of types of the first marine objects, the first data being based on the at least one image acquired by the imaging device;

obtain second data informative of types of the second marine objects, the second data being based on data acquired by the at least one sensor; and

use the obtained data informative of the types of the first marine objects and on the types of the second marine objects to match the first marine objects and the second marine objects as corresponding;

determine data D_{camera} informative of at least an orientation of the given imaging device, including at least roll of the imaging device, at a period of time at which the at least one image has been acquired by the given imaging device, to optimize a matching between: (a) recalculated positions of at least some of the first marine objects, the recalculated positions being determined using D_{camera} and the first position data, and (b) second position data of at least some of the second marine objects in the common referential;

based at least on D_{camera}, determine a distance between the given marine vessel and a given marine object out of the first marine objects, that was acquired by the given imaging device, using data provided by the at least one sensor; and

based on the at least one image, generate a labelled image that comprises the given marine object and a label comprising said given distance.

2. The system of claim 1, configured to determine a type of the given marine vessel using data provided by the at least one sensor, and associate the type with the labelled image.

3. The system of any one of claims 1 and 2, wherein the second position data is not informative of the position of the given marine object.

4. The system of any one of claims 1 to 3, wherein the PMC is operative to match positions of at least some of the first marine objects and positions of at least some of the second marine objects by iteratively modifying a value of an estimated orientation of the imaging device, including at least an estimated roll of the imaging device; and to determine the distance between the given marine vessel and the given marine object further based on results of the matching.

5. The system of claim 4, wherein the at least one image comprises a plurality of images, wherein the PMC is operative to:

obtain the first position data that is informative of positions of different marine objects at distinct times, the first position data being based on the plurality of images acquired by the given imaging device;

obtain the second position data that is informative of positions of different second marine objects at different times;

process the first position data to generate first tracking information for at least one first marine object, indicative of positions of the respective first marine objects at the distinct times;

process the second position data to generate second tracking information for at least one second marine object, indicative of positions of the respective second marine objects at the distinct times; and

match the first marine objects and the second marine objects further based on the first tracking information and the second tracking information.

6. The system of any one of claims 1 to 5, wherein the PMC is operative to match positions of at least some of the first marine objects and positions of at least some of the second marine objects by iteratively modifying a value of an estimated field of view of the given imaging device; and to determine the distance between the given marine vessel and the given marine object further based on results of the matching.

7. The system of any one of claims 1 to 6, wherein the PMC is operative to determine the data D_{camera} that is informative of both height and orientation of the given imaging device at the period of time at which the at least one image has been acquired by the given imaging device.

8. The system of any one of claims 1 to 7, wherein the PMC is operative to determine the data D_{camera} during a voyage of the given marine vessel, wherein the height and the orientation of the given imaging device change during the voyage, wherein the first position data is obtained based on the at least one image acquired by the given imaging device during the voyage at a time in which the height and the orientation of the given imaging device are unknown.

9. A method for determining a distance between a given marine vessel and a given marine object, the method comprising, executing by a processor and memory circuitry (PMC):

obtaining first position data informative of positions of first marine objects, wherein the first position data is obtained based on at least one image acquired by a given imaging device of a given marine vessel;

obtaining second position data informative of positions of second marine objects, wherein the second position data is obtained based on data acquired by at least one sensor that is not an imaging device and that is different from the given imaging device,

wherein at least some of the first marine objects are the same as at least some of the second marine objects;

for each out of a plurality of marine objects of the first marine objects, determining that the respective marine object and a marine object of the second marine objects correspond to a same marine object acquired respectively by the given imaging device and the at least one sensor, wherein matching the first marine objects and the second marine objects as corresponding comprises:

obtaining first data informative of types of the first marine objects, the first data being based on the at least one image acquired by the imaging device;

obtaining second data informative of types of the second marine objects; the second data being based on data acquired by at least one sensor, wherein the at least one sensor includes at least one of a radar and an automatic identification system (AIS); and

using the obtained data informative of types of the first marine objects and on the types of the second marine objects to match the first marine objects and the second marine objects;

determining data D_{camera} informative of at least an orientation of the given imaging device, including at least roll of the imaging device, at a period of time at which the at least one image has been acquired by the given imaging device, to optimize a matching between: (a) recalculated positions of at least some of the first marine objects, the recalculated positions being determined using D_{camera} and the first position data, and (b) second position data of at least some of the second marine objects; and

based at least on D_{camera}, determining a distance between the given marine vessel and a given marine object out of the first marine objects, that was acquired by the given imaging device, using data provided by the at least one sensor.

10. The method of claim 9, comprising determining the data D_{camera} that is informative of both height and orientation of the given imaging device at the period of time at which the at least one image has been acquired by the given imaging device, and matching positions of at least some of the first marine objects and positions of at least some of the second marine

objects by iteratively modifying a value of an estimated orientation of the imaging device including at least estimated roll of the imaging device; wherein the determining of the distance comprises determining the distance between the given marine vessel and the given marine object further based on results of the matching.

11. The method of any one of claims 9 and 10, comprising matching positions of at least some of the first marine objects and positions of at least some of the second marine objects by iteratively modifying a value of an estimated orientation of the imaging device including at least estimated roll of the imaging device;

wherein the determining of the distance comprises determining the distance between the given marine vessel and the given marine object further based on results of the matching.

wherein the at least one image comprises a plurality of images, wherein the first position data is informative of positions of different marine objects at distinct times, the first position data being based on the plurality of images acquired by the given imaging device; wherein the second position data that is informative of positions of different second marine objects at different times; wherein the method comprises:

processing the first position data to generate first tracking information for at least one first marine object, indicative of positions of the respective first marine objects at the distinct times; and

processing the second position data to generate second tracking information for at least one second marine object, indicative of positions of the respective second marine objects at the distinct times;

wherein the matching comprises matching the first marine objects and the second marine objects further based on the first tracking information and the second tracking information.

12. The method of any one of claims 9 to 11, wherein the steps of obtaining the first position data, obtaining the second position data, determining correspondence between first marine objects and second marine objects, determining the data D_{camera}, and determining the distance between the given marine vessel and the given marine object are executed at a

first time in which the given marine vessel is positioned at a first height and a first orientation; wherein the method further comprises:

reiterating the steps of obtaining the first position data, obtaining the second position data, determining correspondence between first marine objects and second marine objects, determining the data D_{camera}, and determining the distance between the given marine vessel and the given marine object at a second time in which the given marine vessel is positioned at a second height differing from the first height and at a second orientation differing from the first orientation, to determine a second distance between the given marine vessel and the given marine object;

wherein the difference between the first height and the second height and the difference between the first orientation and the second orientation cause the given marine object to appear differently in the at least one image on which the first position data of the first time is based comparing to the at least one image on which the first position data of the second time is based, impacting distance estimation.

13. A non-transitory storage device readable by a machine, tangibly embodying a program of instructions executable by the machine to perform operations comprising:

obtaining first position data informative of positions of first marine objects, wherein the first position data is obtained based on at least one image acquired by a given imaging device of a given marine vessel;

obtaining second position data informative of positions of second marine objects, wherein the second position data is obtained based on data acquired by at least one sensor that is not an imaging device and that is different from the given imaging device, wherein at least some of the first marine objects are the same as at least some of the second marine objects;

for each out of a plurality of marine objects of the first marine objects, determining that the respective marine object and a marine object of the second marine objects correspond to a same marine object acquired respectively by the given imaging device and the at least one sensor, wherein matching the first marine objects and the second marine objects as corresponding comprises:

obtaining first data informative of types of the first marine objects, the first data being based on the at least one image acquired by the imaging device;

obtaining second data informative of types of the second marine objects; the second data being based on data acquired by at least one sensor, wherein the at least one sensor includes at least one of a radar and an automatic identification system (AIS); and

using the obtained data informative of types of the first marine objects and on the types of the second marine objects to match the first marine objects and the second marine objects;

determining data D_{camera} informative of at least an orientation of the given imaging device, including at least roll of the imaging device, at a period of time at which the at least one image has been acquired by the given imaging device, to optimize a matching between: (a) recalculated positions of at least some of the first marine objects, the recalculated positions being determined using D_{camera} and the first position data, and (b) second position data of at least some of the second marine objects; and

based at least on D_{camera}, determining a distance between the given marine vessel and a given marine object out of the first marine objects, that was acquired by the given imaging device, using data provided by the at least one sensor.