CLAIMS

1. A method of encoding, into a bitstream, point cloud geometry data sensed by at least one sensor associated with a sensor index, the point cloud geometry data being represented by ordered coarse points occupying some discrete positions of a set of discrete positions of a two-dimensional space, each occupied coarse point is located within the two-dimensional space by a sensor index associated with a sensor that sensed a point of the point cloud associated with the occupied coarse point, and a sample index associated with a sensing time instant at which the point of the point cloud has been sensed, each occupied coarse point is associated with a radius based on a distance of the point of the point cloud from a referential, wherein the method comprises :

- obtaining (105) a list of candidate radiuses ($L = \{r_2\}$) for a first occupied coarse point (P_1) having a first sensor index (λ_1), a first sample index (s_1) and being associated with a first radius (r_1), the list of candidate radiuses comprises at least one second radius (r_2) associated with at least one second occupied coarse point (P_2) having a second sensor index (λ_2) different from the first sensor index (λ_1) and having a second sample index (s_2) lower than or equal to the first sample index (s_1), the at least one second occupied coarse point (P_2) further fulfilling at least one eligibility condition indicating that the radius associated with the at least one second occupied coarse point (P_2) is likely reducing a dynamic of a predictive residual radius (r_{res}) when the first radius (r_1) is predictively encoded;

- selecting (110), for the first occupied coarse point (P_1), a selected predicting radius (r_{pred}) from the list of candidate radiuses ($L = \{r_2\}$);

- encoding (120), in the bitstream, a data (I_{pred}) representative of the selected predicting radius (r_{pred}) in the list of candidate radiuses ($L = \{r_2\}$); and

- predictively encoding (130), in the bitstream, a residual radius (r_{res}) between the first radius (r_1) and the selected predicting radius (r_{pred}).

2. A method of decoding, from a bitstream, point cloud geometry data sensed by at least one sensor associated with a sensor index, the point cloud geometry data being represented by ordered coarse points occupying some discrete positions of a set of discrete positions of a two-dimensional space, each occupied coarse point is located within the two-dimensional space by a sensor index associated with a sensor that sensed a point of the point cloud associated with the occupied coarse point, and a sample index associated with a sensing time instant at which the point of the point cloud has been sensed, each occupied coarse point is associated with a radius based on a distance of the point of the point cloud from a referential, wherein the method comprises :

- obtaining (105) a list of candidate radiuses ($L = \{r_2\}$) for a first occupied coarse point (P_1) having a first sensor index (λ_1) and a first sample index (s_1) and being associated with a first radius (r_1), the list of candidate radiuses comprises at least one second radius (r_2) associated with at least one second occupied coarse point (P_2) having a second

sensor index (λ_2) different of the first sensor index (λ_1) and having a second sample index (s_2) lower than the first sample index (s_1), the at least one second occupied coarse point (P_2) further fulfilling at least one eligibility condition indicating that a radius associated with the at least one second occupied coarse point (P_2) is promising for reducing a dynamic of a predictive residual radius (r_{res}) when the first radius (r_1) is predictively encoded;

- decoding (210), from the bitstream, for a first occupied coarse point (P_1), a data (I_{pred}) representative of a selected predicting radius (r_{pred}) in the list of candidate radiuses ($L = \{r_2\}$);

- decoding (220), from the bitstream, for the first occupied coarse point, a residual radius (r_{res}); and

- obtaining (230) a radius (r_1) associated with a point of the point represented by the first occupied coarse point (P_1), based on the residual radius (r_{res}) and the selected predicting radius (r_{pred}) is obtained from the data (I_{pred}) and the list of candidate radiuses ($L = \{r_2\}$).

3. The method of claims 1 or 2, wherein the list of candidate radiuses further comprises at least one third radius (r_3) associated with at least one third occupied coarse point (P_3) having a third sensor index (λ_3) equal to the first sensor index (λ_1) and a third sample index (s_3) lower than or equal to the first sample index (s_1).

4. The method of claim 3, wherein the eligibility condition is based on a comparison between a second sample index (s_2) of a second occupied coarse point (P_2) and a third sample index (s_3) of a third occupied coarse point (P_3).

5. The method of claim 4, wherein the eligibility condition is fulfilled by the second occupied coarse point (P_2) when the second sample index (s_2) is greater than the third sample index (s_3).

6. The method of one of claims 3 to 5, wherein the eligibility condition is based on a comparison of azimuthal angles associated with sensors used to sense points of the point cloud associated with the first, second and third occupied coarse points.

7. The method of claim 6, wherein the eligibility condition is fulfilled by a second occupied coarse point (P_2) when a first azimuthal angle difference is lower than a second azimuthal angle difference, the first azimuthal angle difference being a difference between a first azimuthal angle (ϕ_1) associated with the first occupied coarse point (P_1) and a second azimuthal angle (ϕ_2) associated with the second occupied coarse point (P_2), and the second azimuthal angle difference being a difference between the first azimuthal angle (ϕ_1) associated with the first occupied coarse point (P_1) and a third azimuthal angle (ϕ_3) associated with the third occupied coarse point (P_3).

8. The method of claim 1 or 2, wherein an eligibility condition is fulfilled by a second occupied coarse point (P_2) when a distance is greater than a threshold (th1), the distance being calculated between a second radius (r_2) associated with the second occupied coarse point (P_2) and a third radius (r_3) associated with a third occupied coarse point (P_3)

having a third sensor index (λ_3) equal to the first sensor index (λ_1) and having a third sample index (s_3) lower than or equal to the first sample index (s_1), and the threshold (th1) being based on precedingly encoded or decoded residual radius (r_{res}) associated with occupied coarse points having sensor index equal to the first sensor index (λ_1).

9. The method of claim 1 or 2, wherein an eligibility condition is fulfilled by a second occupied coarse point (P_2) when a ratio of a gradient of radius over a gradient of sample indices estimated from at least two precedingly encoded or decoded second occupied coarse points, is greater than a threshold.

10. An apparatus of encoding, into a bitstream, point cloud geometry data sensed by at least one sensor associated with a sensor index, the point cloud geometry data being represented by ordered coarse points occupying some discrete positions of a set of discrete positions of a two-dimensional space, each occupied coarse point is located within the two-dimensional space by a sensor index associated with a sensor that sensed a point of the point cloud associated with the occupied coarse point, and a sample index associated with a sensing time instant at which the point of the point cloud has been sensed, each occupied coarse point is associated with a radius based on a distance of the point of the point cloud from a referential, wherein the apparatus comprises at least one processor configured to:

- obtain a list of candidate radiuses ($L = \{r_2\}$) for a first occupied coarse point (P_1) having a first sensor index (λ_1), a first sample index (s_1) and being associated with a first radius (r_1), the list of candidate radiuses comprises at least one second radius (r_2) associated with at least one second occupied coarse point (P_2) having a second sensor index (λ_2) different from the first sensor index (λ_1) and having a second sample index (s_2) lower than or equal to the first sample index (s_1), the at least one second occupied coarse point (P_2) further fulfilling at least one eligibility condition indicating that the radius associated with the at least one second occupied coarse point (P_2) is likely reducing a dynamic of a predictive residual radius (r_{res}) when the first radius (r_1) is predictively encoded;

- select, for the first occupied coarse point (P_1), a selected predicting radius (r_{pred}) from the list of candidate radiuses ($L = \{r_2\}$);

- encode, in the bitstream, a data (I_{pred}) representative of the selected predicting radius (r_{pred}) in the list of candidate radiuses ($L = \{r_2\}$); and

- predictively encode, in the bitstream, a residual radius (r_{res}) between the first radius (r_1) and the selected predicting radius (r_{pred}).

11. An apparatus of decoding, from a bitstream, point cloud geometry data sensed by at least one sensor associated with a sensor index, the point cloud geometry data being represented by ordered coarse points occupying some discrete positions of a set of discrete positions of a two-dimensional space, each occupied coarse point is located within the two-dimensional space by a sensor index associated with a sensor that sensed a point of the point cloud associated with the occupied coarse point, and a sample index

associated with a sensing time instant at which the point of the point cloud has been sensed, each occupied coarse point is associated with a radius based on a distance of the point of the point cloud from a referential, wherein the apparatus comprises at least one processor configured to:

- obtain a list of candidate radiuses ($L = \{r_2\}$) for a first occupied coarse point (P_1) having a first sensor index (λ_1) and a first sample index (s_1) and being associated with a first radius (r_1), the list of candidate radiuses comprises at least one second radius (r_2) associated with at least one second occupied coarse point (P_2) having a second sensor index (λ_2) different of the first sensor index (λ_1) and having a second sample index (s_2) lower than the first sample index (s_1), the at least one second occupied coarse point (P_2) further fulfilling at least one eligibility condition indicating that a radius associated with the at least one second occupied coarse point (P_2) is promising for reducing a dynamic of a predictive residual radius (r_{res}) when the first radius (r_1) is predictively encoded;

- decode, from the bitstream, for a first occupied coarse point (P_1), a data (I_{pred}) representative of a selected predicting radius (r_{pred}) in the list of candidate radiuses ($L = \{r_2\}$);

- decode, from the bitstream, for the first occupied coarse point, a residual radius (r_{res}); and

- obtain a radius (r_1), associated with a point of the point represented by the first occupied coarse point (P_1), based on the residual radius (r_{res}) and the selected predicting radius (r_{pred}) is obtained from the data (I_{pred}) and the list of candidate radiuses ($L = \{r_2\}$).

12. A computer program product including instructions which, when the program is executed by one or more processors, causes the one or more processors to carry out a method of encoding, into a bitstream, point cloud geometry data sensed by at least one sensor associated with a sensor index, the point cloud geometry data being represented by ordered coarse points occupying some discrete positions of a set of discrete positions of a two-dimensional space, each occupied coarse point is located within the two-dimensional space by a sensor index associated with a sensor that sensed a point of the point cloud associated with the occupied coarse point, and a sample index associated with a sensing time instant at which the point of the point cloud has been sensed, each occupied coarse point is associated with a radius based on a distance of the point of the point cloud from a referential, wherein the method comprises :

- obtaining (105) a list of candidate radiuses ($L = \{r_2\}$) for a first occupied coarse point (P_1) having a first sensor index (λ_1), a first sample index (s_1) and being associated with a first radius (r_1), the list of candidate radiuses comprises at least one second radius (r_2) associated with at least one second occupied coarse point (P_2) having a second sensor index (λ_2) different from the first sensor index (λ_1) and having a second sample index (s_2) lower than or equal to the first sample index (s_1), the at least one second occupied coarse point (P_2) further fulfilling at least one eligibility condition indicating that the radius associated with the at least one second occupied coarse point (P_2) is likely reducing a

dynamic of a predictive residual radius (r_{res}) when the first radius (r_1) is predictively encoded;

- selecting (110), for the first occupied coarse point (P_1), a selected predicting radius (r_{pred}) from the list of candidate radiuses ($L = \{r_2\}$);

- encoding (120), in the bitstream, a data (I_{pred}) representative of the selected predicting radius (r_{pred}) in the list of candidate radiuses ($L = \{r_2\}$); and

- predictively encoding (130), in the bitstream, a residual radius (r_{res}) between the first radius (r_1) and the selected predicting radius (r_{pred}).

13. A non-transitory storage medium carrying instructions of program code for executing a method of encoding, into a bitstream, point cloud geometry data sensed by at least one sensor associated with a sensor index, the point cloud geometry data being represented by ordered coarse points occupying some discrete positions of a set of discrete positions of a two-dimensional space, each occupied coarse point is located within the two-dimensional space by a sensor index associated with a sensor that sensed a point of the point cloud associated with the occupied coarse point, and a sample index associated with a sensing time instant at which the point of the point cloud has been sensed, each occupied coarse point is associated with a radius based on a distance of the point of the point cloud from a referential, wherein the method comprises :

- obtaining (105) a list of candidate radiuses ($L = \{r_2\}$) for a first occupied coarse point (P_1) having a first sensor index (λ_1), a first sample index (s_1) and being associated with a first radius (r_1), the list of candidate radiuses comprises at least one second radius (r_2) associated with at least one second occupied coarse point (P_2) having a second sensor index (λ_2) different from the first sensor index (λ_1) and having a second sample index (s_2) lower than or equal to the first sample index (s_1), the at least one second occupied coarse point (P_2) further fulfilling at least one eligibility condition indicating that the radius associated with the at least one second occupied coarse point (P_2) is likely reducing a dynamic of a predictive residual radius (r_{res}) when the first radius (r_1) is predictively encoded;

- selecting (110), for the first occupied coarse point (P_1), a selected predicting radius (r_{pred}) from the list of candidate radiuses ($L = \{r_2\}$);

- encoding (120), in the bitstream, a data (I_{pred}) representative of the selected predicting radius (r_{pred}) in the list of candidate radiuses ($L = \{r_2\}$); and

- predictively encoding (130), in the bitstream, a residual radius (r_{res}) between the first radius (r_1) and the selected predicting radius (r_{pred}).

14. A computer program product including instructions which, when the program is executed by one or more processors, causes the one or more processors to carry out a method of decoding, from a bitstream, point cloud geometry data sensed by at least one sensor associated with a sensor index, the point cloud geometry data being represented by ordered coarse points occupying some discrete positions of a set of discrete positions

of a two-dimensional space, each occupied coarse point is located within the two-dimensional space by a sensor index associated with a sensor that sensed a point of the point cloud associated with the occupied coarse point, and a sample index associated with a sensing time instant at which the point of the point cloud has been sensed, each occupied coarse point is associated with a radius based on a distance of the point of the point cloud from a referential, wherein the method comprises :

- obtaining (105) a list of candidate radiuses ($L = \{r_2\}$) for a first occupied coarse point (P_1) having a first sensor index (λ_1) and a first sample index (s_1) and being associated with a first radius (r_1), the list of candidate radiuses comprises at least one second radius (r_2) associated with at least one second occupied coarse point (P_2) having a second sensor index (λ_2) different of the first sensor index (λ_1) and having a second sample index (s_2) lower than the first sample index (s_1), the at least one second occupied coarse point (P_2) further fulfilling at least one eligibility condition indicating that a radius associated with the at least one second occupied coarse point (P_2) is promising for reducing a dynamic of a predictive residual radius (r_{res}) when the first radius (r_1) is predictively encoded;

- decoding (210) , from the bitstream, for a first occupied coarse point (P_1), a data (I_{pred}) representative of a selected predicting radius (r_{pred}) in the list of candidate radiuses ($L = \{r_2\}$);

- decoding (220), from the bitstream, for the first occupied coarse point, a residual radius (r_{res}); and

- obtaining (230) a radius (r_1), associated with a point of the point represented by the first occupied coarse point (P_1), based on the residual radius (r_{res}) and the selected predicting radius (r_{pred}) is obtained from the data (I_{pred}) and the list of candidate radiuses ($L = \{r_2\}$).

15. A non-transitory storage medium carrying instructions of program code for executing a method of decoding, from a bitstream, point cloud geometry data sensed by at least one sensor associated with a sensor index, the point cloud geometry data being represented by ordered coarse points occupying some discrete positions of a set of discrete positions of a two-dimensional space, each occupied coarse point is located within the two-dimensional space by a sensor index associated with a sensor that sensed a point of the point cloud associated with the occupied coarse point, and a sample index associated with a sensing time instant at which the point of the point cloud has been sensed, each occupied coarse point is associated with a radius based on a distance of the point of the point cloud from a referential, wherein the method comprises :

- obtaining (105) a list of candidate radiuses ($L = \{r_2\}$) for a first occupied coarse point (P_1) having a first sensor index (λ_1) and a first sample index (s_1) and being associated with a first radius (r_1), the list of candidate radiuses comprises at least one second radius (r_2) associated with at least one second occupied coarse point (P_2) having a second sensor index (λ_2) different of the first sensor index (λ_1) and having a second sample index (s_2) lower than the first sample index (s_1), the at least one second occupied coarse point (P_2) further fulfilling at least one eligibility condition indicating that a radius associated with

the at least one second occupied coarse point (P_2) is promising for reducing a dynamic of a predictive residual radius (r_{res}) when the first radius (r_1) is predictively encoded;

- decoding (210) , from the bitstream, for a first occupied coarse point (P_1), a data (I_{pred}) representative of a selected predicting radius (r_{pred}) in the list of candidate radiuses ($L = \{r_2\}$);

- decoding (220), from the bitstream, for the first occupied coarse point, a residual radius (r_{res}); and

- obtaining (230) a radius (r_1) associated with a point of the point represented by the first occupied coarse point (P_1), based on the residual radius (r_{res}) and the selected predicting radius (r_{pred}) is obtained from the data (I_{pred}) and the list of candidate radiuses ($L = \{r_2\}$).