CLAIMS

1. A three-dimensional data encoding method, comprising:

encoding a first flag indicating whether a node having a parent node different from a parent node of a current node is to be referred to in encoding of the current node included in an n-ary tree structure of three-dimensional points included in three-dimensional data, n being an integer greater than or equal to 2;

selecting a coding table from N coding tables according to occupancy states of neighboring nodes of the current node, and performing arithmetic encoding on information of the current node using the coding table selected, when the first flag indicates that the node is to be referred to; and

selecting a coding table from M coding tables according to the occupancy states of the neighboring nodes of the current node, and performing arithmetic encoding on information of the current node using the coding table selected, when the first flag indicates that the node is not to be referred to, M being an integer different from N.

2. The three-dimensional data encoding method according to claim 1, wherein N is greater than M.

3. The three-dimensional data encoding method according to claim 1 or 2,

wherein when a coding table is selected from the M coding tables, the coding table is selected from the M coding tables by reference to a correspondence table according to the occupancy states of the neighboring nodes, the correspondence table indicating a correspondence relationship between L

occupancy patterns indicating the occupancy states of the neighboring nodes and the M coding tables, L being an integer greater than M.

4. The three-dimensional data encoding method according to claim 1 or 2,

wherein when a coding table is selected from the M coding tables, the coding table is selected from the M coding tables by reference to a first correspondence table and a second correspondence table, according to the occupancy states of the neighboring nodes, the first correspondence table indicating a correspondence relationship between L occupancy patterns indicating the occupancy states of the neighboring nodes and I coding tables, the second correspondence table indicating a correspondence relationship between the I coding tables and the M coding tables, L being an integer greater than I, I being an integer greater than M.

5. The three-dimensional data encoding method according to any one of claims 1 to 4,

wherein the occupancy states of the neighboring nodes when the first flag indicates that the node is not to be referred to are occupancy patterns represented by combinations of a position of the current node in a parent node and occupancy states of three neighboring nodes in the parent node, and

an identical coding table among the M coding tables is assigned to, among the occupancy patterns, occupancy patterns in which one of the three neighboring nodes is occupied and neighbors the current node in a direction horizontal to an x-y plane.

6. The three-dimensional data encoding method according to any one of

claims 1 to 4,

wherein the occupancy states of the neighboring nodes when the first flag indicates that the node is not to be referred to are occupancy patterns represented by combinations of a position of the current node in a parent node and occupancy states of three neighboring nodes in the parent node, and

an identical coding table among the M coding tables is assigned to, among the occupancy patterns, occupancy patterns in which one of the three neighboring nodes is occupied and neighbors the current node in a direction vertical to an x-y plane.

7. The three-dimensional data encoding method according to any one of claims 1 to 4,

wherein the occupancy states of the neighboring nodes when the first flag indicates that the node is not to be referred to are occupancy patterns represented by combinations of a position of the current node in a parent node and occupancy states of three neighboring nodes in the parent node, and

an identical coding table among the M coding tables is assigned to, among the occupancy patterns, occupancy patterns in which two of the three neighboring nodes are occupied and a plane defined by the two of the three neighboring nodes occupied and the current node is horizontal to an x-y plane.

8. The three-dimensional data encoding method according to any one of claims 1 to 4,

wherein the occupancy states of the neighboring nodes when the first flag indicates that the node is not to be referred to are occupancy patterns represented by combinations of a position of the current node in a parent node and occupancy states of three neighboring nodes in the parent node, and

an identical coding table among the M coding tables is assigned to, among the occupancy patterns, occupancy patterns in which two of the three neighboring nodes are occupied and a plane defined by the two of the three neighboring nodes occupied and the current node is vertical to an x-y plane.

9. A three-dimensional data decoding method, comprising:

decoding a first flag indicating whether a node having a parent node different from a parent node of a current node is to be referred to in decoding of the current node included in an n-ary tree structure of three-dimensional points included in three-dimensional data, n being an integer greater than or equal to 2;

selecting a coding table from N coding tables according to occupancy states of neighboring nodes of the current node, and performing arithmetic decoding on information of the current node using the coding table selected, when the first flag indicates that the node is to be referred to; and

selecting a coding table from M coding tables according to the occupancy states of the neighboring nodes of the current node, and performing arithmetic decoding on information of the current node using the coding table selected, when the first flag indicates that the node is not to be referred to, M being an integer different from N.

10. The three-dimensional data decoding method according to claim 9, wherein N is greater than M.

11. The three-dimensional data decoding method according to claim 9 or 10,

wherein when a coding table is selected from the M coding tables, the

coding table is selected from the M coding tables by reference to a correspondence table, according to the occupancy states of the neighboring nodes, the correspondence table indicating a correspondence relationship between L occupancy patterns indicating the occupancy states of the neighboring nodes and the M coding tables, L being an integer greater than M.

12. The three-dimensional data decoding method according to claim 9 or 10,

wherein when a coding table is selected from the M coding tables, the coding table is selected from the M coding tables by reference to a first correspondence table and a second correspondence table, according to the occupancy states of the neighboring nodes, the first correspondence table indicating a correspondence relationship between L occupancy patterns indicating the occupancy states of the neighboring nodes and I coding tables, the second correspondence table indicating a correspondence relationship between the I coding tables and the M coding tables, L being an integer greater than I, I being an integer greater than M.

13. The three-dimensional data decoding method according to any one of claims 9 to 12,

wherein the occupancy states of the neighboring nodes when the first flag indicates that the node is not to be referred to are occupancy patterns represented by combinations of a position of the current node in a parent node and occupancy states of three neighboring nodes in the parent node, and

an identical coding table among the M coding tables is assigned to, among the occupancy patterns, occupancy patterns in which one of the three neighboring nodes is occupied and neighbors the current node in a direction

horizontal to an x-y plane.

14. The three-dimensional data decoding method according to any one of claims 9 to 12,

wherein the occupancy states of the neighboring nodes when the first flag indicates that the node is not to be referred to are occupancy patterns represented by combinations of a position of the current node in a parent node and occupancy states of three neighboring nodes in the parent node, and

an identical coding table among the M coding tables is assigned to, among the occupancy patterns, occupancy patterns in which one of the three neighboring nodes is occupied and neighbors the current node in a direction vertical to an x-y plane.

15. The three-dimensional data decoding method according to any one of claims 9 to 12,

wherein the occupancy states of the neighboring nodes when the first flag indicates that the node is not to be referred to are occupancy patterns represented by combinations of a position of the current node in a parent node and occupancy states of three neighboring nodes in the parent node, and

an identical coding table among the M coding tables is assigned to, among the occupancy patterns, occupancy patterns in which two of the three neighboring nodes are occupied and a plane defined by the two of the three neighboring nodes occupied and the current node is horizontal to an x-y plane.

16. The three-dimensional data decoding method according to any one of claims 9 to 12,

wherein the occupancy states of the neighboring nodes when the first

flag indicates that the node is not to be referred to are occupancy patterns represented by combinations of a position of the current node in a parent node and occupancy states of three neighboring nodes in the parent node, and

an identical coding table among the M coding tables is assigned to, among the occupancy patterns, occupancy patterns in which two of the three neighboring nodes are occupied and a plane defined by the two of the three neighboring nodes occupied and the current node is vertical to an x-y plane.

17. A three-dimensional data encoding device that encodes three-dimensional points each including attribute information, the three-dimensional data encoding device comprising:

a processor; and

memory,

wherein using the memory, the processor:

encodes a first flag indicating whether a node having a parent node different from a parent node of a current node is to be referred to in encoding of the current node included in an n-ary tree structure of three-dimensional points included in three-dimensional data, n being an integer greater than or equal to 2;

selects a coding table from N coding tables according to occupancy states of neighboring nodes of the current node, and performs arithmetic encoding on information of the current node using the coding table selected, when the first flag indicates that the node is to be referred to; and

selects a coding table from M coding tables according to the occupancy states of the neighboring nodes of the current node, and performs arithmetic encoding on information of the current node using the coding table selected, when the first flag indicates that the node is not to be referred to, M

being an integer different from N.

18. A three-dimensional data decoding device that decodes three-dimensional points each including attribute information, the three-dimensional data decoding device comprising:

a processor; and

memory,

wherein using the memory, the processor:

decodes a first flag indicating whether a node having a parent node different from a parent node of a current node is to be referred to in decoding of the current node included in an n-ary tree structure of three-dimensional points included in three-dimensional data, n being an integer greater than or equal to 2;

selects a coding table from N coding tables according to occupancy states of neighboring nodes of the current node, and performs arithmetic decoding on information of the current node using the coding table selected, when the first flag indicates that the node is to be referred to; and

selects a coding table from M coding tables according to the occupancy states of the neighboring nodes of the current node, and performs arithmetic decoding on information of the current node using the coding table selected, when the first flag indicates that the node is not to be referred to, M being an integer different from N.