CLAIMS

1. An image predictive encoding device comprising:

region partition means adapted to partition an input image into a plurality of regions that include a target region serving as an encoding target;

prediction information estimation means adapted to sub-partition the target region into a plurality of prediction regions, determine a prediction block partitioning type for the target region, predict motion information from a previously-reconstructed signal for acquisition of each of a plurality of signals highly correlated with the respective prediction regions, and obtain prediction information containing the prediction block partitioning type and the motion information, the prediction block partitioning type indicating a number and region shapes of the prediction regions;

prediction information encoding means adapted to encode the prediction information associated with the target region;

predicted signal generation means adapted to generate a predicted signal of the target region based on the prediction information associated with the target region;

residual signal generation means adapted to generate a residual signal based on the predicted signal of the target region and a pixel signal of the target region;

residual signal encoding means adapted to encode the residual signal generated by the residual signal generation means;

residual signal restoration means adapted to decode the encoded residual signal to generate a reconstructed residual signal; and

recording means adapted to add the predicted signal to the reconstructed residual signal to generate a restored pixel signal of the target region, and to store the restored pixel signal as the previously-reconstructed signal,

wherein the prediction information encoding means includes prediction information storage means adapted to store previously-encoded prediction information, and the prediction information encoding means is further adapted to encode the prediction block partitioning type of the target region and store the prediction block partitioning type into the prediction information storage means based on: the prediction information of a region neighboring the target region, a number of previously-encoded prediction regions in the target region, and the previously-encoded prediction information of the target region;

the prediction information encoding means further adapted to select a candidate for motion information, the candidate for motion information for use in generation of a predicted signal of a target prediction region serving as a next prediction region, and the candidate for motion information selected from previously-encoded motion information of a region neighboring the target prediction region;

the prediction information encoding means further adapted to encode, according to the number of candidates for the motion information selected, merging block information indicative of generation of the predicted signal of the target prediction region, or encode either one of the merging block information or the motion information, wherein the merging block information is encoded using

the selected candidate for motion information and the motion information detected by the prediction information estimation means; and

the prediction information encoding means further adapted to store the motion information for use in generation of the predicted signal of the target prediction region into the prediction information storage means.

2. The image predictive encoding device according to claim 1, wherein, the prediction information encoding means is further adapted to select the candidate for motion information of the target prediction region serving as the next prediction region from the previously-encoded motion information of the region neighboring the target prediction region, the candidate for motion information selected based on: the number of previously-encoded prediction regions in the target region, the prediction block partitioning type of the target region, and a prediction block partitioning type of the region neighboring the target region.

3. The image predictive encoding device according to claim 1, wherein the prediction information encoding means is further adapted to select the candidate for motion information of the target prediction region serving as the next prediction region from the previously-encoded motion information of the region neighboring the target prediction region, the candidate for motion information selected based on the number of previously-encoded prediction regions in the

target region and the prediction block partitioning type of the target region; and

wherein the prediction information encoding means is adapted to select motion information of a region neighboring the target prediction region which is not included in the target region when the target region is partitioned into two prediction regions and the target prediction region is a prediction region encoded second in the target region, the motion information selected as the candidate for motion information for use in generation of the predicted signal of the target prediction region.

4. The image predictive encoding device according to claim 1, wherein, the prediction information encoding means is adapted to select the candidate for motion information for use in generation of the predicted signal of the target prediction region serving as the next prediction region, the candidate for motion information selected based on: the number of previously-encoded prediction regions in the target region, the prediction block partitioning type of the target region, the previously-encoded motion information in the target region, and the motion information of the region neighboring the target region, wherein the candidate for motion information is selected from the previously-encoded motion information of the region neighboring the target prediction region; and

wherein the prediction information encoding means is further adapted to determine that the motion information of the region neighboring the target prediction region is not used in generation of the

predicted signal of the target prediction region, and to encode the motion information when the target region is partitioned into two prediction regions, the target prediction region is a prediction region to be encoded second in the target region, and the motion information of the prediction region encoded first in the target region is the same as motion information of a region neighboring the target prediction region which is not included in the target region.

5. An image predictive decoding device comprising:

data analysis means adapted to extract, from compressed data of an image: encoded data of prediction information to indicate a prediction method to be used in prediction of a signal of a target region serving as a decoding target, encoded data of a predicted signal of the target region, and encoded data of a residual signal;

the compressed data of the image resulting from partition into a plurality of regions and encoding of the target region;

prediction information decoding means adapted to decode the encoded data of the prediction information to restore a prediction block partitioning type and motion information, the prediction block partitioning type indicating a number of prediction regions and region shapes of the prediction regions, wherein the prediction regions are sub-partitioned regions of the target region, and the motion information is used for acquisition of each of a plurality of predicted signals of the respective prediction regions from a previously-reconstructed signal;

predicted signal generation means adapted to generate the predicted signal of the target region based on the prediction information

associated with the target region;

residual signal restoration means adapted to restore a reconstructed residual signal of the target region from the encoded data of the residual signal; and

recording means adapted to add the predicted signal to the reconstructed residual signal to restore a pixel signal of the target region, and to store the pixel signal as the previously-reconstructed signal,

wherein the prediction information decoding means includes prediction information storage means adapted to store previously-decoded prediction information of the target region, and the prediction information decoding means is further adapted to decode the prediction block partitioning type of the target region and store the prediction block partitioning type into the prediction information storage means;

the prediction information decoding means further adapted to select a candidate for motion information to be used in generation of a predicted signal of a target prediction region serving as a next prediction region, the candidate for motion information selected based on: the prediction information of a region neighboring the target region, a number of previously-decoded prediction regions in the target region, and the previously-decoded prediction information of the target region, wherein the candidate for motion information is selected from previously-decoded motion information of a region neighboring the target prediction region; and

according to the number of candidates for motion information selected, the prediction information decoding means further

adapted to decode merging block information using the selected candidate for motion information and the motion information, or decode either one of the merging block information or the motion information, wherein the merging block information is indicative of generation of the predicted signal of the target prediction region;

the prediction information decoding means further adapted to store the motion information to be used in generation of the predicted signal of the target prediction region into the prediction information storage means.

6. The image predictive decoding device according to claim 5, wherein the prediction information decoding means is further adapted to select the candidate for motion information of the target prediction region serving as the next prediction region from the previously-decoded motion information of the region neighboring the target prediction region, the candidate for motion information selected based on the number of previously-decoded prediction regions in the target region, the prediction block partitioning type of the target region, and a prediction block partitioning type of the region neighboring the target region.

7. The image predictive decoding device according to claim 5, wherein the prediction information decoding means is further adapted to select the candidate for motion information to be used in generation of the predicted signal of the target prediction region serving as the next prediction region based on the number of previously-decoded prediction

regions in the target region and the prediction block partitioning type of the target region, wherein the candidate for motion information is selected from the previously-decoded motion information of the region neighboring the target prediction region; and

wherein the prediction information decoding means is further adapted to select motion information of a region neighboring the target prediction region as the candidate for motion information of the target prediction region when the target region is partitioned into two prediction regions and the target prediction region is a prediction region to be decoded second in the target region, the region neighboring the target prediction region not included in the target region.

8. The image predictive decoding device according to claim 5, wherein the prediction information decoding means is further adapted to select the candidate for motion information to be used in generation of the predicted signal of the target prediction region serving as the next prediction region based on: the number of previously-decoded prediction regions in the target region, the prediction block partitioning type of the target region, the previously-decoded motion region in the target region, and the motion information of the region neighboring the target region, wherein the candidate for motion information is selected from the previously-decoded motion information of the region neighboring the target prediction region; and

wherein the prediction information decoding means is further adapted to determine that the motion information of the region neighboring the target prediction region is not used in generation of the

predicted signal of the target prediction region, and decode the motion information when the target region is partitioned into two prediction regions, the target prediction region is a prediction region to be decoded second in the target region, and the motion information of the prediction region decoded first in the target region is the same as motion information of a region neighboring the target prediction region which is not included in the target region.

9. An image predictive encoding method comprising:

a region partition step of partitioning an input image into a plurality of regions that include a target region serving as an encoding target;

a prediction information estimation step of sub-partitioning the target region into a plurality of prediction regions, determining a prediction block partitioning type indicating a number and region shapes of the prediction regions, estimating motion information from a previously-reconstructed signal for acquisition of each of a plurality of signals highly correlated with the respective prediction regions, and obtaining prediction information containing the prediction block partitioning type and the motion information;

a prediction information encoding step of encoding the prediction information associated with the target region;

a predicted signal generation step of generating a predicted signal of the target region based on the prediction information associated with the target region;

a residual signal generation step of generating a residual signal

based on the predicted signal of the target region and a pixel signal of the target region;

a residual signal encoding step of encoding the residual signal generated in the residual signal generation step;

a residual signal restoration step of decoding the encoded residual signal to generate a reconstructed residual signal; and

a recording step of adding the predicted signal to the reconstructed residual signal to generate a restored pixel signal of the target region, and storing the restored pixel signal as the previously-reconstructed signal,

wherein the prediction information encoding step further comprises the steps of:

encoding the prediction block partitioning type of the target region and storing the prediction block partitioning type into a prediction information storage means adapted to store previously-encoded prediction information,

selecting a candidate for motion information to be used in generation of a predicted signal of a target prediction region serving as a next prediction region, from previously-encoded motion information of a region neighboring the target prediction region, the candidate for motion information selected based on: the prediction information of a region neighboring the target region, a number of previously-encoded prediction regions in the target region, and the previously-encoded prediction information of the target region;

encoding, according to a number of candidates for

motion information selected, merging block information indicative of generation of the predicted signal of the target prediction region using the selected candidate for motion information and the motion information detected in the prediction information estimation step, or encoding either one of the merging block information or the motion information, and

storing the motion information to be used in generation of the predicted signal of the target prediction region into the prediction information storage means.

10. An image predictive encoding program for causing a computer to function as:

region partition means adapted to partition an input image into a plurality of regions that include a target region serving as an encoding target;

prediction information estimation means adapted to sub-partition the target region into a plurality of prediction regions, determine a prediction block partitioning type for the target region, predict motion information from a previously-reconstructed signal for acquisition of each of a plurality of signals highly correlated with the respective prediction regions, and obtain prediction information containing the prediction block partitioning type and the motion information, where the prediction block partitioning type indicates a number and region shapes of the respective prediction regions for the target region;

prediction information encoding means adapted to encode the

prediction information associated with the target region;

predicted signal generation means adapted to generate a predicted signal of the target region based on the prediction information associated with the target region;

residual signal generation means adapted to generate a residual signal based on the predicted signal of the target region and a pixel signal of the target region;

residual signal encoding means adapted to encode the residual signal generated by the residual signal generation means;

residual signal restoration means adapted to decode the encoded residual signal to generate a reconstructed residual signal; and

recording means adapted to add the predicted signal to the reconstructed residual signal to generate a restored pixel signal of the target region and to store the restored pixel signal as the previously-reconstructed signal;

wherein the prediction information encoding means includes prediction information storage means adapted to store previously-encoded prediction information, and the prediction information encoding means is adapted to encode the prediction block partitioning type of the target region and store the prediction block partitioning type into the prediction information storage means based on: the prediction information of a region neighboring the target region, a number of previously-encoded prediction regions in the target region, and the previously-encoded prediction information of the target region;

the prediction information encoding means further adapted to select a candidate for motion information from previously-encoded

motion information of a region neighboring the target prediction region, the candidate for motion information to be used in generation of a predicted signal of a target prediction region serving as a next prediction region;

the prediction information encoding means further adapted to encode, according to a number of candidates for the motion information selected, merging block information indicative of generation of the predicted signal of the target prediction region using the selected candidate for motion information and the motion information detected by the prediction information estimation means, or encode either one of the merging block information or the motion information; and

the prediction information encoding means further adapted to store the motion information to be used in generation of the predicted signal of the target prediction region into the prediction information storage means.

11. An image predictive decoding method comprising:

a data analysis step of extracting, from compressed data of an image, encoded data of prediction information to indicate a prediction method to be used in prediction of a signal of a target region serving as a decoding target, encoded data of a predicted signal of the target region, and encoded data of a residual signal, wherein the compressed data of the image is a result of partition into a plurality of regions and encoding of the target region;

a prediction information decoding step of decoding the encoded data of the prediction information to restore a prediction block

partitioning type and motion information, the prediction block partitioning type indicating a number of prediction regions and region shapes of the prediction regions, wherein the prediction regions are sub-partitioned regions of the target region, and the motion information is used for acquisition of each of a plurality of predicted signals of the respective prediction regions from a previously-reconstructed signal;

a predicted signal generation step of generating the predicted signal of the target region based on the prediction information associated with the target region;

a residual signal restoration step of restoring a reconstructed residual signal of the target region from the encoded data of the residual signal; and

a recording step of adding the predicted signal to the reconstructed residual signal to restore a pixel signal of the target region, and storing the pixel signal as the previously-reconstructed signal,

wherein the prediction information decoding step further comprises the steps of:

decoding the prediction block partitioning type of the target region and storing the prediction block partitioning type as previously-decoded prediction information into a prediction information storage means storing previously-decoded prediction information;

selecting a candidate for motion information to be used in generation of a predicted signal of a target prediction region serving as a next prediction region based on: the prediction information of a region neighboring the target region, a number

of previously-decoded prediction regions in the target region, and the previously-decoded prediction information of the target region, wherein the candidate for motion information is selected from previously-decoded motion information of a region neighboring the target prediction region;

decoding, according to a number of candidates for motion information selected, merging block information using the selected candidate for motion information and the motion information, or decoding either one of the merging block information or the motion information, wherein the merging block information is indicative of generation of the predicted signal of the target prediction region; and

storing the motion information to be used in generation of the predicted signal of the target prediction region into the prediction information storage means.

12. An image predictive decoding program for causing a computer to function as:

data analysis means adapted to extract, from compressed data of an image, encoded data of prediction information to indicate a prediction method to be used in prediction of a signal of a target region serving as a decoding target, encoded data of a predicted signal of the target region, and encoded data of a residual signal, wherein the compressed data of the image results from partition into a plurality of regions and encoding of the target region;

prediction information decoding means adapted to decode the

encoded data of the prediction information to restore a prediction block partitioning type and motion information, the prediction block partitioning type indicating a number of prediction regions and region shapes of the prediction regions, wherein the prediction regions are sub-partitioned regions of the target region, and the motion information is used for acquisition of each of a plurality of predicted signals of the respective prediction regions from a previously-reconstructed signal;

predicted signal generation means adapted to generate the predicted signal of the target region based on the prediction information associated with the target region;

residual signal restoration means adapted to restore a reconstructed residual signal of the target region from the encoded data of the residual signal; and

recording means adapted to add the predicted signal to the reconstructed residual signal to restore a pixel signal of the target region, and to store the pixel signal as the previously-reconstructed signal;

wherein the prediction information decoding means includes prediction information storage means adapted to store previously-decoded prediction information of the target region, the prediction information decoding means is further adapted to decode the prediction block partitioning type of the target region and store the prediction block partitioning type into the prediction information storage means;

the prediction information decoding means further adapted to select a candidate for motion information to be used in generation of a predicted signal of a target prediction region serving as a

next prediction region, from previously-decoded motion information of a region neighboring the target prediction region, the candidate for motion information selected based on: prediction information of the region neighboring the target region, a number of previously-decoded prediction regions in the target region, and the previously-decoded prediction information of the target region;

the prediction information decoding means further adapted to decode, according to a number of candidates for motion information selected, merging block information using the selected candidate for motion information and the motion information, or decode either one of the merging block information or the motion information, wherein the merging block information is indicative of generation of the predicted signal of the target prediction region; and

the prediction information decoding means further adapted to store the motion information to be used in generation of the predicted signal of the target prediction region into the prediction information storage means.

13. A video encoding device comprising:

partition means adapted to partition an input image in a video sequence into a plurality of partitions;

sub-partition generation means adapted to partition a processing target partition generated by the partition means, into a plurality of sub-partitions and to generate shape information to specify shapes of the sub-partitions;

motion detection means adapted to detect a motion vector of the

processing target partition;

predicted signal generation means adapted to generate a predicted signal of the processing target partition from a previously-reconstructed image signal using the motion vector detected by the motion detection means;

motion prediction means adapted to generate a motion vector predictor of the processing target partition based on the shape information generated by the sub-partition generation means and a motion vector of a previously-processed partial region, the previously-processed partial region being a partition or a sub-partition prior in a processing order to the processing target partition;

differential motion vector generation means adapted to generate a differential motion vector based on a difference between the motion vector used in generation of the predicted signal of the processing target partition and the motion vector predictor;

residual signal generation means adapted to generate a residual signal based on a difference between the predicted signal and a pixel signal of the processing target partition;

addition means adapted to add the residual signal to the predicted signal to generate a reconstructed image signal;

storage means adapted to store the reconstructed image signal as a previously-reconstructed image signal; and

encoding means adapted to encode the residual signal generated by the residual signal generation means, the differential motion vector generated by the differential vector generation means, and the shape information generated by the sub-partition generation means, to

generate compressed data,

wherein when a processing target sub-partition in the processing target partition has no contact with a partition prior in the processing order to the processing target sub-partition, the motion prediction means is adapted to generate the motion vector predictor of the processing target sub-partition based on a motion vector of a previously-processed partial region which belongs to either a domain also containing the processing target sub-partition, or an other domain, wherein the domain and the other domain are partitioned by an extension line of a boundary between the processing target sub-partition and another sub-partition in the processing target partition.

14. A method for encoding a video sequence, comprising:

a partition step of partitioning an input image in the video sequence into a plurality of partitions;

a sub-partition generation step of partitioning a processing target partition generated in the partition step, into a plurality of sub-partitions and generating shape information to specify shapes of the sub-partitions;

a motion detection step of detecting a motion vector of the processing target partition;

a predicted signal generation step of generating a predicted signal of the processing target partition, from a previously-reconstructed image signal, using the motion vector detected in the motion detection step;

a motion prediction step of generating a motion vector predictor

of the processing target partition, based on the shape information generated in the sub-partition generation step and a motion vector of a previously-processed partial region, wherein the previously-processed partial region is a partition or a sub-partition prior in a processing order to the processing target partition;

a differential motion vector generation step of generating a differential motion vector based on a difference between the motion vector of the processing target partition and the motion vector predictor;

a residual signal generation step of generating a residual signal based on a difference between the predicted signal of the processing target partition and a pixel signal of the processing target partition;

an addition step of adding the residual signal to the predicted signal to generate a reconstructed image signal;

a storage step of storing the reconstructed image signal as a previously-reconstructed image signal; and

an encoding step of encoding, to generate compressed data, the residual signal generated in the residual signal generation step, the differential motion vector generated in the differential motion vector generation step, and the shape information generated in the sub-partition generation step;

wherein when a processing target sub-partition in the processing target partition has no contact with a partition prior in the processing order to the processing target sub-partition, the motion prediction step comprises generating a motion vector predictor of the processing target sub-partition based on the motion vector of the previously-processed partial region which belongs to either a domain also containing the

processing target sub-partition or an other domain, the domain and the other domain being partitioned by an extension line of a boundary between the processing target sub-partition and another sub-partition in the processing target partition.

15. A video encoding program for causing a computer to function as:

partition means adapted to partition an input image in a video sequence into a plurality of partitions;

sub-partition generation means adapted to partition a processing target partition generated by the partition means, into a plurality of sub-partitions and to generate shape information to specify shapes of the sub-partitions;

motion detection means adapted to detect a motion vector of the processing target partition;

predicted signal generation means adapted to generate a predicted signal of the processing target partition from a previously-reconstructed image signal, using the motion vector detected by the motion detection means;

motion prediction means adapted to generate a motion vector predictor of the processing target partition, based on the shape information generated by the sub-partition generation means and a motion vector of a previously-processed partial region, the previously processed region being a partition or a sub-partition prior in a processing order to the processing target partition;

differential motion vector generation means adapted to generate

a differential motion vector, based on a difference between the motion vector used in generation of the predicted signal of the processing target partition and the motion vector predictor;

residual signal generation means adapted to generate a residual signal based on a difference between the predicted signal and a pixel signal of the processing target partition;

addition means adapted to add the residual signal to the predicted signal to generate a reconstructed image signal;

storage means adapted to store the reconstructed image signal as a previously-reconstructed image signal; and

encoding means adapted to encode the residual signal generated by the residual signal generation means, the differential motion vector generated by the differential vector generation means, and the shape information generated by the sub-partition generation means, to generate compressed data,

wherein when a processing target sub-partition in the processing target partition has no contact with a partition prior in the processing order to the processing target sub-partition, the motion prediction means is further adapted to generate a motion vector predictor of the processing target sub-partition based on the motion vector of the previously-processed partial region which belongs to either of a domain also containing the processing target sub-partition, or an other domain, the domain and the other domain being partitioned by an extension line of a boundary between the processing target sub-partition and another sub-partition in the processing target partition.

16. A video decoding device comprising:

decoding means adapted to decode compressed data to generate a reconstructed residual signal of a processing target partition in an image, a differential motion vector of the processing target partition, and shape information to specify shapes of a plurality of sub-partitions in the processing target partition;

motion prediction means adapted to generate a motion vector predictor of the processing target partition, based on the shape information and a motion vector of a previously-processed partial region, the previously-processed partial region being a partition or a sub-partition prior in a processing order to the processing target partition;

vector addition means adapted to add the motion vector predictor generated by the motion prediction means, to the differential motion vector generated by the decoding means, and to generate a motion vector of the processing target partition;

predicted signal generation means adapted to generate a predicted signal of the processing target partition from a previously-reconstructed image signal based on the motion vector of the processing target partition;

addition means adapted to add the predicted signal to the reconstructed residual signal generated by the decoding means to generate a reconstructed image signal; and

storage means adapted to store the reconstructed image signal as a previously-reconstructed image signal,

wherein when a processing target sub-partition in the processing

target partition has no contact with a partition prior in the processing order to the processing target sub-partition, the motion prediction means is further adapted to generate a motion vector predictor of the processing target sub-partition, based on a motion vector of a previously-processed partial region which belongs to either a domain also containing the processing target sub-partition or an other domain, the domain and the other domain being partitioned by an extension line of a boundary between the processing target sub-partition and another sub-partition in the processing target partition.

17. A method for decoding compressed data to generate a video sequence, comprising:

a decoding step of decoding the compressed data to generate a reconstructed residual signal of a processing target partition in an image, a differential motion vector of the processing target partition, and shape information to specify shapes of a plurality of sub-partitions in the processing target partition;

a motion prediction step of generating a motion vector predictor of the processing target partition based on the shape information and a motion vector of a previously-processed partial region, the previously-processed partial region being a partition or a sub-partition prior in a processing order to the processing target partition;

a vector addition step of adding the motion vector predictor generated in the motion prediction step, to the differential motion vector generated in the decoding step, to generate a motion vector of the processing target partition;

a predicted signal generation step of generating a predicted signal of the processing target partition from a previously-reconstructed image signal based on the motion vector of the processing target partition;

an addition step of adding the predicted signal to the reconstructed residual signal generated in the decoding step, to generate a reconstructed image signal; and

a storage step of storing the reconstructed image signal as a previously-reconstructed image signal,

wherein when a processing target sub-partition in the processing target partition has no contact with a partition prior in the processing order to the processing target sub-partition, the motion prediction step comprises generating a motion vector predictor of the processing target sub-partition, based on the motion vector of the previously-processed partial region which belongs to either a domain also containing the processing target sub-partition or an other domain, the domain and the other domain being partitioned by an extension line of a boundary between the processing target sub-partition and another sub-partition in the processing target partition.

18. A video decoding program for letting a computer function as:

decoding means adapted to decode compressed data to generate a reconstructed residual signal of a processing target partition in an image, a differential motion vector of the processing target partition, and shape information to specify shapes of a plurality of sub-partitions in

the processing target partition;

motion prediction means adapted to generate a motion vector predictor of the processing target partition, based on the shape information and a motion vector of a previously-processed partial region, the previously-processed partial region being a partition or a sub-partition prior in a processing order to the processing target partition;

vector addition means adapted to add the motion vector predictor generated by the motion prediction means, to the differential motion vector generated by the decoding means, to generate a motion vector of the processing target partition;

predicted signal generation means adapted to generate a predicted signal of the processing target partition from a previously-reconstructed image signal based on the motion vector of the processing target partition;

addition means adapted to add the predicted signal to the reconstructed residual signal generated by the decoding means, to generate a reconstructed image signal; and

storage means adapted to store the reconstructed image signal as a previously-reconstructed image signal,

wherein when a processing target sub-partition in the processing target partition has no contact with a partition prior in the processing order to the processing target sub-partition, the motion prediction means is further adapted to generate a motion vector predictor of the processing target sub-partition, based on a motion vector of a previously-processed partial region which belongs to either a domain

containing the processing target sub-partition or an other domain, the domain and the other domain being partitioned by an extension line of a boundary between the processing target sub-partition and another sub-partition in the processing target partition.

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CLAIMS

1. An image predictive encoding device comprising:

region partition means adapted to partition an input image into a plurality of regions;

prediction information estimation means adapted to

sub-partition a target region serving as an encoding target partitioned by the region partition means into a first prediction region and a second prediction region,

determine a prediction block partitioning type indicating a number and region shapes of the prediction regions suitable for the target region,

predict first and second motion information respectively for acquiring a signal highly correlated with the first prediction region and a signal highly correlated with the second prediction region based on previously-reconstructed signals, and

obtain prediction information including:

the prediction block partitioning type,

the first motion information,

the second motion information,

a first merge identification information indicating whether or not to utilize decoded motion information associated with neighboring regions neighboring the first prediction region for generating a predicted signal of the first prediction region, and

a second merge identification information indicating whether or not to utilize decoded motion information except the first motion information from among the decoded motion information associated with neighboring regions neighboring the second prediction region for generating a predicted signal of the second prediction region;

prediction information encoding means adapted to encode the prediction information associated with the target region;

predicted signal generation means adapted to generate a predicted signal of each of the first and second prediction regions based on the first motion information and the second motion information;

residual signal generation means adapted to generate a residual signal based on a pixel signal and the predicted signal of each of the first and second prediction regions;

residual signal encoding means adapted to encode the residual signal generated by the residual signal generation means;

residual signal restoration means adapted to decode the encoded residual signal to generate a reconstructed residual signal; and

recording means adapted to generate a restored pixel signal of the target region based on the predicted signal and the reconstructed residual signal and to store the restored pixel signal as the previously-reconstructed signal.

2. An image predictive encoding method executed by an image predictive encoding device, comprising:

a region partition step of partitioning an input image into a plurality of regions;

a prediction information estimation step of

sub-partitioning a target region serving as an encoding target partitioned by the region partition step into a first prediction region and a second prediction region,

determining a prediction block partitioning type indicating a number and region shapes of the prediction regions suitable for the target region,

predicting first and second motion information respectively for acquiring a signal highly correlated with the first prediction region and a signal highly correlated with the second prediction region based on previously-reconstructed signals, and

obtaining prediction information including:

the prediction block partitioning type,

the first motion information,

the second motion information,

a first merge identification information indicating whether or not to utilize decoded motion information associated with neighboring regions neighboring the first prediction region for generating a predicted signal of the first prediction region, and

a second merge identification information indicating whether or not to utilize decoded motion information except the first motion information from among the decoded motion information associated with neighboring regions neighboring the second prediction region for generating a predicted signal of the second prediction region;

a prediction information encoding step of encoding the prediction information associated with the target region;

a predicted signal generation step of generating a predicted signal of each of the first and second prediction regions based on the first motion information and the second motion information;

a residual signal generation step of generating a residual signal based on a pixel signal and the predicted signal of each of the first and second prediction regions;

a residual signal encoding step of encoding the residual signal generated by the residual signal generation step;

a residual signal restoration step of decoding the encoded residual signal to generate a reconstructed residual signal; and

a recording step of generating a restored pixel signal of the target region based on the predicted signal and the reconstructed residual signal and of storing the restored pixel signal as the previously-reconstructed signal.

3. An image predictive encoding program for causing a computer to function as:

region partition means adapted to partition an input image into a plurality of regions;

prediction information estimation means adapted to

sub-partition a target region serving as an encoding target partitioned by the region partition means into a first prediction region and a second prediction region,

determine a prediction block partitioning type indicating a number and region shapes of the prediction regions suitable for the target region,

predict first and second motion information respectively for acquiring a signal highly correlated with the first prediction

region and a signal highly correlated with the second prediction region based on previously-reconstructed signals, and

obtain prediction information including:

the prediction block partitioning type,

the first motion information,

the second motion information,

a first merge identification information indicating whether or not to utilize decoded motion information associated with neighboring regions neighboring the first prediction region for generating a predicted signal of the first prediction region, and

a second merge identification information indicating whether or not to utilize decoded motion information except the first motion information from among the decoded motion information associated with neighboring regions neighboring the second prediction region for generating a predicted signal of the second prediction region;

prediction information encoding means adapted to encode the prediction information associated with the target region;

predicted signal generation means adapted to generate a predicted signal of each of the first and second prediction regions based on the first motion information and the second motion information;

residual signal generation means adapted to generate a residual signal based on a pixel signal and the predicted signal of each of the first and second prediction regions;

residual signal encoding means adapted to encode the residual signal generated by the residual signal generation means;

residual signal restoration means adapted to decode the encoded residual signal to generate a reconstructed residual signal; and

recording means adapted to generate a restored pixel signal of the target region based on the predicted signal and the reconstructed residual signal and to store the restored pixel signal as the previously-reconstructed signal.

4. An image predictive decoding device comprising:

data analysis means adapted to extract encoded data of prediction

information to indicate a prediction method to be used in prediction of a signal of a target region serving as a decoding target and encoded data of a residual signal, from compressed image data obtained by partitioning an image into a plurality of regions and encoding image data of the regions;

prediction information decoding means adapted to restore motion information based on the encoded data of prediction information,

wherein the prediction information decoding means restores a prediction block partitioning type indicating a number of prediction regions obtained by sub-partitioning the target region, based on the encoded data of prediction information,

wherein, when the prediction block partitioning type indicates that the target region includes a first prediction region and a second prediction region, the prediction information decoding means further decodes the encoded data of prediction information to restore a first merge identification information indicating whether or not to utilize decoded motion information associated with neighboring regions neighboring the first prediction region for generating a predicted signal of the first prediction region,

wherein, when the first merge identification information indicates not to utilize the decoded motion information, the prediction information decoding means further decodes the encoded data of prediction information to restore a first motion information utilized for generating the predicted signal of the first prediction region,

wherein, when the first merge identification information indicates to utilize the decoded motion information, the prediction information decoding means further decodes the encoded data of prediction information to restore a first selection information identifying the first motion information utilized for generating the predicted signal of the first prediction region based on the decoded motion information associated with neighboring regions neighboring the first prediction region and to restore the first motion information based on the first selection information,

wherein, the prediction information decoding means further

decodes the encoded data of prediction information to restore a second merge identification information indicating whether or not to utilize decoded motion information associated with neighboring regions neighboring the second prediction region for generating a predicted signal of the second prediction region,

wherein, when the second merge identification information indicates not to utilize the decoded motion information, the prediction information decoding means further decodes the encoded data of prediction information to restore a second motion information utilized for generating the predicted signal of the second prediction region, and

wherein, when the second merge identification information indicates to utilize the decoded motion information, the prediction information decoding means further decodes the encoded data of prediction information to restore a second selection information identifying the second motion information utilized for generating the predicted signal of the second prediction region based on candidate for the decoded motion information except the first motion information from among the decoded motion information associated with neighboring regions neighboring the second prediction region, and to restore the second motion information based on the second selection information;

storing means adapted to store motion information included in restored prediction information;

predicted signal generation means adapted to generate a predicted signal of each of the first and second prediction regions in the target region based on the restored first motion information and the restored second motion information;

residual signal restoration means adapted to restore a reconstructed residual signal of the target region based on the encoded data of the residual signal; and

recording means adapted to generate a restored pixel signal of the target region based on the predicted signal and the reconstructed residual signal and to store the restored pixel signal as the previously-reconstructed signal.

5. An image predictive decoding method executed by an image predictive decoding device, comprising:

a data analysis step of extracting encoded data of prediction information to indicate a prediction method to be used in prediction of a signal of a target region serving as a decoding target and encoded data of a residual signal, from compressed image data obtained by partitioning an image into a plurality of regions and encoding image data of the regions;

a prediction information decoding step of restoring motion information based on the encoded data of prediction information,

wherein the image predictive decoding device restores a prediction block partitioning type indicating a number of prediction regions obtained by sub-partitioning the target region, based on the encoded data of prediction information,

wherein, when the prediction block partitioning type indicates that the target region includes a first prediction region and a second prediction region, the image predictive decoding device further decodes the encoded data of prediction information to restore a first merge identification information indicating whether or not to utilize decoded motion information associated with neighboring regions neighboring the first prediction region for generating a predicted signal of the first prediction region,

wherein, when the first merge identification information indicates not to utilize the decoded motion information, the image predictive decoding device further decodes the encoded data of prediction information to restore a first motion information utilized for generating the predicted signal of the first prediction region,

wherein, when the first merge identification information indicates to utilize the decoded motion information, the image predictive decoding device further decodes the encoded data of prediction information to restore a first selection information identifying the first motion information utilized for generating the predicted signal of the first prediction region based on the decoded motion information associated with neighboring regions neighboring the first prediction region and to restore the first

motion information based on the first selection information,

wherein, the image predictive decoding device further decodes the encoded data of prediction information to restore a second merge identification information indicating whether or not to utilize decoded motion information associated with neighboring regions neighboring the second prediction region for generating a predicted signal of the second prediction region,

wherein, when the second merge identification information indicates not to utilize the decoded motion information, the image predictive decoding device further decodes the encoded data of prediction information to restore a second motion information utilized for generating the predicted signal of the second prediction region, and

wherein, when the second merge identification information indicates to utilize the decoded motion information, the image predictive decoding device further decodes the encoded data of prediction information to restore a second selection information identifying the second motion information utilized for generating the predicted signal of the second prediction region based on candidate for the decoded motion information except the first motion information from among the decoded motion information associated with neighboring regions neighboring the second prediction region, and to restore the second motion information based on the second selection information;

a storing step of storing motion information included in restored prediction information;

a predicted signal generation step of generating a predicted signal of each of the first and second prediction regions in the target region based on the restored first motion information and the restored second motion information;

a residual signal restoration step of restoring a reconstructed residual signal of the target region based on the encoded data of the residual signal; and

a recording step of generating a restored pixel signal of the target region based on the predicted signal and the reconstructed residual signal

and to store the restored pixel signal as the previously-reconstructed signal.

6. An image predictive decoding program for causing a computer to function as:

data analysis means adapted to extract encoded data of prediction information to indicate a prediction method to be used in prediction of a signal of a target region serving as a decoding target and encoded data of a residual signal, from compressed image data obtained by partitioning an image into a plurality of regions and encoding image data of the regions;

prediction information decoding means adapted to restore motion information based on the encoded data of prediction information,

wherein the prediction information decoding means restores a prediction block partitioning type indicating a number of prediction regions obtained by sub-partitioning the target region, based on the encoded data of prediction information,

wherein, when the prediction block partitioning type indicates that the target region includes a first prediction region and a second prediction region, the prediction information decoding means further decodes the encoded data of prediction information to restore a first merge identification information indicating whether or not to utilize decoded motion information associated with neighboring regions neighboring the first prediction region for generating a predicted signal of the first prediction region,

wherein, when the first merge identification information indicates not to utilize the decoded motion information, the prediction information decoding means further decodes the encoded data of prediction information to restore a first motion information utilized for generating the predicted signal of the first prediction region,

wherein, when the first merge identification information indicates to utilize the decoded motion information, the prediction information decoding means further decodes the encoded data of prediction information to restore a first selection information identifying the first motion information utilized for generating the predicted signal of the first prediction region

based on the decoded motion information associated with neighboring regions neighboring the first prediction region and to restore the first motion information based on the first selection information,

wherein, the prediction information decoding means further decodes the encoded data of prediction information to restore a second merge identification information indicating whether or not to utilize decoded motion information associated with neighboring regions neighboring the second prediction region for generating a predicted signal of the second prediction region,

wherein, when the second merge identification information indicates not to utilize the decoded motion information, the prediction information decoding means further decodes the encoded data of prediction information to restore a second motion information utilized for generating the predicted signal of the second prediction region, and

wherein, when the second merge identification information indicates to utilize the decoded motion information, the prediction information decoding means further decodes the encoded data of prediction information to restore a second selection information identifying the second motion information utilized for generating the predicted signal of the second prediction region based on candidate for the decoded motion information except the first motion information from among the decoded motion information associated with neighboring regions neighboring the second prediction region, and to restore the second motion information based on the second selection information;

storing means adapted to store motion information included in restored prediction information;

predicted signal generation means adapted to generate a predicted signal of each of the first and second prediction regions in the target region based on the restored first motion information and the restored second motion information;

residual signal restoration means adapted to restore a reconstructed residual signal of the target region based on the encoded data of the

residual signal; and

recording means adapted to generate a restored pixel signal of the target region based on the predicted signal and the reconstructed residual signal and to store the restored pixel signal as the previously-reconstructed signal.