CLAIMS

1. A method, implemented by a coding device, for processing a block associated with an image or a video, comprising:

scanning, according to a predefined scan template, to obtain a current pixel of the block and neighboring pixels of the current pixel, wherein the block is a reconstructed block or a predicted block of the image or the video;

obtaining spectrum components by performing a transform for the current pixel and the neighboring pixels of the current pixel, wherein the transform is a Hadamard transform;

determining whether a filter is to be applied to the spectrum components obtained by performing the Hadamard transform based on one or more conditions;

when the filter is to be applied to the spectrum components, obtaining filtered spectrum components based on a filtering parameter and the spectrum components;

when the filter is not to be applied to the spectrum components, saving the spectrum components without changing;

obtaining filtered pixels by performing an inverse transform on the filtered spectrum components; and

generating a filtered block based on the filtered pixels.

2. The method of claim 1, wherein the filtering parameter or the predefined scan template depends on the one or more conditions.

3. The method of claim 1, wherein the filter is applied if the size of the block obtained as a block width multiplied by a block height is greater than 4×4; or the filter is applied if the prediction mode of the block is an inter prediction mode and the block has a non-zero residual signal; or the filter is applied if the prediction mode of the block is an intra prediction mode.

4. The method of claim 1, wherein the obtaining the filtered spectrum components comprises estimating the filtered spectrum components based on a look up table (LUT).

5. The method of claim 4, wherein a filtered spectrum component $F(i,\sigma)$ is estimated by:

$$F(i,\sigma) = \begin{cases} R(i) \ , \ Abs\big(R(i)\big) \geq THR \\ LUT(R(i),\sigma), \ R(i) > 0 \\ -LUT(-R(i),\sigma), \ R(i) \leq 0 \end{cases}$$

wherein (i) is an index of a spectrum component, R(i) is the spectrum component corresponding to index i, σ is the filtering parameter, LUT is an array representing the look up table, and THR is a threshold.

6. The method of claim 5, wherein $LUT(R(i),\sigma) = \frac{R(i)^3}{R(i)^2+\mathrm{m}*\sigma^2}$, and m is a normalization constant equal to a number of spectrum components.

7. The method of claim 4, wherein the filtering parameter is derived based on a codec quantization parameter (QP).

8. The method of claim 7, wherein the filtering parameter σ is derived by

$$\boldsymbol{\sigma = k * 2^{(n*(QP-s))}}$$

wherein QP is the codec quantization parameter, and k, n and s are constants.

9. The method of claim 8, wherein k is modified based on a bit depth of pixels $k_{mod} = k$*(1 << (bit_depth - 8)) and k_{mod} is used to replace k to derive the filtering parameter σ.

10. The method of claim 5, wherein the THR is dependent of a QP value.

11. The method of claim 10, the THR is derived by:

$$\frac{THR^2}{THR^2+m*\sigma^2}=\mathrm{C}$$

wherein C is a value close to 1.

12. The method of claim 1, wherein the predefined scan template is defined as a set of spatial or raster offsets relative to a position of the current pixel inside the reconstructed block.

13. The method of claim 12, wherein when the predefined scan template is defined as a set of raster offsets relative to the position of the current pixel inside the reconstructed block, the set of raster offsets point to neighbor pixels that are inside the reconstructed block.

14. The method of claim 1, wherein the filtered pixels are added to an accumulation buffer according to the predefined scan template, and wherein the accumulation buffer is initialized by zero before the obtaining filtered spectrum components.

15. The method of claim 14, wherein final filtered pixels are obtained as accumulated values in the accumulation buffer divided by respective numbers of pixels added to respective positions of the accumulation buffer; and

wherein generating the filtered block is performed based on the final filtered pixels.

16. An apparatus of a video encoder or a video decoder, comprising:

a memory comprising instructions; and

one or more processors in communication with the memory, wherein the one or more processors execute the instructions to:

scanning, according to a predefined scan template, to obtain a current pixel of a block and neighboring pixels of the current pixel, wherein the block is a reconstructed block or a predicted block;

obtaining spectrum components by performing a transform for the current pixel and the neighboring pixels of the current pixel, wherein the transform is a Hadamard transform;

determining whether a filter is to be applied to the spectrum components obtained by performing the Hadamard transform based on one or more conditions;

when the filter is to be applied to the spectrum components, obtaining filtered spectrum components based on a filtering parameter and the spectrum components;

when the filter is not to be applied to the spectrum components, saving the spectrum components without changing;

obtaining filtered pixels by performing an inverse transform on the filtered spectrum components; and

generating a filtered block based on the filtered pixels.

17. The method of claim 1, wherein the one or more conditions include at least one of:

the block has a non-zero residual signal,

a size of the block,

an aspect ratio of the block,

a prediction mode of the block,

a prediction mode of the block in intra, or

a prediction mode of the block in inter.

18. The apparatus of claim 16, wherein the one or more conditions include at least one of:

the block has a non-zero residual signal,

a size of the block,

an aspect ratio of the block,

a prediction mode of the block,

a prediction mode of the block in intra, or

a prediction mode of the block in inter.