

**WHAT IS CLAIMED IS:**

1. A computer-implemented method, comprising:  
generating a curve based on a plurality of points, wherein each point specifies  
a different visual quality level and a corresponding encoding bitrate for  
5 encoding a first chunk included in a plurality of chunks of source data;  
computing a first encoding bitrate for encoding the first chunk based on the  
generated curve and a computed optimization factor that is associated  
with different visual quality levels and corresponding encoding bitrates  
for the plurality of chunks; and  
10 causing the first chunk to be encoded at the first encoding bitrate.
2. The computer-implemented method of claim 1, wherein generating the curve  
comprises performing one or more curve-fitting operations based on the plurality of  
points.  
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3. The computer-implemented method of claim 1, further comprising prior to  
generating the curve, computing a first point included in the plurality of points, and  
computing a second point included in the plurality of points substantially in parallel to  
computing the first point.  
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4. The computer-implemented method of claim 3, wherein computing the first  
point comprises configuring an encoder to encode the first chunk based on a first  
visual quality level, and determining the corresponding encoding bitrate based on the  
encoded first chunk.  
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5. The computer-implement method of claim 1, wherein computing the first  
encoding bitrate comprises determining a tangent to the generated curve, and  
determining a value for an encoding bitrate that corresponds to the tangent based on  
the generated curve.  
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6. The computer-implement method of claim 1, wherein computing the first  
encoding bitrate comprises performing one or more Lagrangian optimization  
operations on the generated curve based on the computed optimization factor.

7. The computer-implemented method of claim 1, wherein computing the computed optimization factor comprises:

generating a representative curve that is associated with encoding a representative chunk included in the plurality of chunks;

5 computing a tangent to the representative curve corresponding to a representative encoding bitrate; and

determining the slope of the tangent.

8. The computer-implemented method of claim 1, wherein causing the first chunk  
10 to be encoded at the first encoding bitrate comprises configuring an encoder to encode the first chunk at the first encoding bitrate, and further comprising configuring the encoder to encode a second chunk included in the plurality of chunks at a second encoding bitrate and substantially in parallel to encoding the first chunk.

15 9. A computer-readable storage medium including instructions that, when executed by a processor, cause the processor to perform the steps of:

performing one or more curve computation operations to generate a first curve that specifies different visual quality levels and corresponding encoding  
20 bitrates for encoding a first chunk included in a plurality of chunks of source data;

performing one or more optimization operations to compute a first encoding  
bitrate for encoding the first chunk based on the first curve and a Lagrangian multiplier that is associated with different visual quality  
25 levels and corresponding encoding bitrates when encoding the plurality of chunks;

performing one or more optimization operations to compute a second encoding  
bitrate for encoding a second chunk included in the plurality of chunks based on a second curve and the Lagrangian multiplier;

causing the first chunk to be encoded at the first encoding bitrate; and

30 causing the second chunk to be encoded at the second encoding bitrate and substantially in parallel to the encoding of the first chunk.

10. The computer-readable storage medium of claim 9, wherein the first curve comprises a logarithmic curve.

11. The computer-readable storage medium of claim 9, wherein performing the one or more curve computation operations comprises computing a plurality of points, wherein each point specifies a different visual quality level and a corresponding  
5 encoding bitrate for encoding the first chunk, and performing one or more curve-fitting operations based on the plurality of points.

12. The computer-readable storage medium of claim 11, wherein computing a first point included in the plurality of points comprises configuring an encoder to encode  
10 the first chunk based on a first visual quality level, and determining the corresponding encoding bitrate based on the encoded first chunk.

13. The computer-readable storage medium of claim 9, wherein the visual quality levels are based on at least one of a Video Multimethod Assessment Fusion, a peak  
15 signal-to-noise ratio, and a mean-squared-error.

14. The computer-readable storage medium of claim 9, wherein performing the one or more optimization operations to compute the first encoding bitrate comprises determining a tangent to the first curve, and determining a value for an encoding  
20 bitrate that corresponds to the tangent based on the first curve.

15. The computer-readable storage medium of claim 9, further comprising prior to performing the one or more optimization operations to compute the first encoding  
bitrate:

25       generating a representative curve that is associated with encoding a  
          representative chunk included in the plurality of chunks;  
          computing a tangent to the representative curve corresponding to a  
          representative encoding bitrate; and  
          setting the Lagrangian multiplier equal to the slope of the tangent.

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16. The computer-readable storage medium of claim 9, wherein causing the first chunk to be encoded at the first encoding bitrate comprises configuring an encoder that implements a VP9 video compression standard to encode the first chunk at the first encoding bitrate.

17. The computer-readable storage medium of claim 9, wherein performing the one or more optimization operations to compute the second encoding bitrate occurs substantially in parallel to performing the one or more optimization operations to  
5 compute the first encoding bitrate.

18. A system, comprising:  
a memory storing instructions; and  
a processor that is coupled to the memory and, when executing the  
10 instructions, is configured to:  
determine a Lagrangian multiplier that is associated with different visual  
quality levels and corresponding encoding bitrates when  
encoding a plurality of chunks of source data;  
for each chunk included in the plurality of chunks, independently  
15 performing one or more optimizations operations based on the  
Lagrangian multiplier to determine an encoding bitrate; and  
for each chunk included in the plurality of chunks, causing the chunk to  
be encoded at the encoding bitrate associated with the chunk.

20 19. The system of claim 18, wherein the visual quality levels are based on at least one of a Video Multimethod Assessment Fusion, a peak signal-to-noise ratio, and a mean-squared-error.

20. The system of claim 18, wherein the processor is configured to perform the  
25 one or more optimization operations for a first chunk included in the plurality of  
chunks by:

generating a first curve that specifies different visual quality levels and  
corresponding encoding bitrates for encoding the first chunk;  
determining a tangent to the first curve; and  
30 determining a value for an encoding bitrate that corresponds to the tangent  
based on the first curve.

21. The system of claim 18, wherein the processor is configured to perform the  
one or more optimization operations for a first chunk included in the plurality of  
35 chunks by:

generating a first curve that specifies different visual quality levels and  
corresponding encoding bitrates for encoding the first chunk;  
computing a derivative of the first curve; and  
determining a value for an encoding bitrate based on the derivative.

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