WHAT IS CLAIMED IS:

1. A method of adaptive neural image compression by meta-learning, the method being performed by at least one processor, and the method comprising:

generating a substitute input image and a substitute target quality control parameter using an original input image and a target quality control parameter, wherein the substitute input image is a modified version of the original input image and the substitute target quality control parameter is a modified version of the target quality control parameter; and

encoding the substitute input image, based on the substitute input image and the substitute target quality control parameter, using an encoding neural network, to generate a compressed representation of the substitute input image;

wherein the generating the substitute input image comprises, for each of a plurality of iterations:

computing an overall rate-distortion loss using the target quality control parameter;

computing a gradient of the overall rate-distortion loss using backpropagation; and

updating the substitute input image and the substitute target quality control parameter based on the gradient of the overall rate-distortion loss.

2. The method of claim 1, wherein a number of the plurality of iterations is based on updates to the substitute input image being less than a first preset threshold.

3. The method of claim 1, wherein a number of the plurality of iterations is based on updates to the substitute target quality control parameter being less than a second threshold.

4. The method of claim 1, wherein performing a first iteration from the plurality of iterations comprises initializing the substitute input image as the original input image and the substitute target quality control parameter as the target quality control parameter.

5. The method of claim 1, further comprising generating a compressed bitstream based on the compressed representation of the substitute input image using quantization and entropy encoding.

6. The method of claim 1, further comprising:

receiving a recovered compressed bitstream and the substitute target quality control parameter;

generating a recovered compressed representation, based on the recovered compressed bitstream and the received substitute target quality control parameter using dequantization and entropy decoding; and

decoding the generated recovered compressed representation based on the received substitute target quality control parameter using a decoding neural network to reconstruct an output image.

7. The method of claim 1, wherein the method is performed by at least one processor, the encoding comprises:

generating an alternate input image and an alternative target quality control parameter using the original input image and the target quality control parameter, and the alternative input image is a modified version of the original input image, and the alternative target quality control parameter is a modified version of the target quality control parameter;

encoding, using the encoding neural network, the alternative input image based on the alternative input image and the alternative target quality control parameters to generate a compressed representation of the alternative input image;

wherein encoding the alternative input image to generate the compressed representation of the alternative input image comprises:

generating a first combined output based on a first combination of a first shared encoding performed on the substitute input image using first shared encoding parameters and a first adaptive encoding performed on the substitute input image using first adaptive encoding parameters; and

generating a second combined output based on a second combination of a second shared encoding performed on the first combined output using second shared encoding parameters and a second adaptive encoding performed on the first combined output using second adaptive encoding parameters.

8. The method of claim 7, wherein generating the first combined output comprises:

generating shared features based on the substitute input image and the first shared encoding parameters;

generating estimated first adaptive encoding parameters based on the substitute input image, the substitute target quality control parameter, the first adaptive encoding parameters, and the generated shared features, using a prediction neural network; and

generating the first combined output based on the generated shared features and the generated estimated first adaptive encoding parameters.

9. An apparatus for adaptive neural image compression by meta-learning, the apparatus is configured to carry out the method of any one of claims 1-8.

10. A non-transitory computer readable medium storing instructions, the instructions comprising: one or more instructions that, when executed by one or more processors of a device for adaptive neural image compression by meta-learning, cause the one or more processors to carry out the method of any one of claims 1-8.