Information technology - Lossless and near-lossless compression of continuous-tone still images - Extensions

CONTENTS

Page

1 Scope 1

2 Normative references 1

2.1 Identical Recommendations | International Standards 1

2.2 Additional references 1

3 Definitions, abbreviations, symbols and conventions 2

3.1 Definitions 2

3.2 Abbreviations 2

3.3 Symbols 2

4 General 3

4.1 Extensions specified by this Recommendation | International Standard 4

4.1.1 Encoding with arithmetic coding 4

4.1.2 Extension of near-lossless coding 4

4.1.3 Extension of prediction 5

4.1.4 Extension of Golomb coding 5

4.1.5 Fixed length coding 5

4.1.6 Sample transformation for inverse colour transforms 5

4.2 Descriptions of extended functions 5

5 Interchange format requirements 6

6 Encoder requirements 6

7 Decoder requirements 6

8 Conformance testing for extensions 7

8.1 Purpose 7

8.2 Encoder conformance tests 7

8.3 Decoder conformance tests 7

Annex A – Encoding procedures with arithmetic coding for a single component 10

A.1 Coding parameters and compressed image data 10

A.2 Initializations and conventions 10

A.2.1 Initializations 10

A.2.2 Conventions for figures 12

A.3 Context determination 12

A.3.1 Local gradient computation 12

A.3.2 Flat region detection 13

A.3.3 Local gradient quantization 13

A.3.4 Quantized gradient merging 14

A.3.5 Adjustment of error tolerance for near-lossless coding with visual quantization 14

A.4 Prediction 14

A.4.1 Edge-detecting predictor 14

A.4.2 Prediction correction 14

A.4.3 Computation of prediction error 15

A.4.4 Error quantization for near-lossless coding, and reconstructed value computation 16

A.4.5 Modulo reduction of the prediction error 16

A.5 Prediction error encoding 16

A.5.1 Error mapping 17

A.5.2 Binarization of MErrval with the Golomb code tree 17

A.5.3 Mapped-error encoding 18

A.6 Update variables 18

A.6.1 Update 18

A.6.2 Bias computation 21

A.7 Flow of encoding procedures 22

Page

Annex B – Arithmetic coding 24
B.1 Arithmetic encoding procedures 24
B.1.1 Binary arithmetic encoding principles 24
B.1.2 Procedures of arithmetic coding 25
B.2 Arithmetic decoding procedures 28
B.2.1 Binary arithmetic decoding principles 28
B.2.2 Procedures of arithmetic decoding 28

Annex C – Encoding with arithmetic coding for multiple component images 30
C.1 Introduction 30
C.2 Line interleaved mode 30
C.2.1 Description 30
C.2.2 Process flow 30
C.3 Sample interleaved mode 30
C.3.1 Description 30
C.3.2 Process flow 31
C.4 Minimum coded unit (MCU) 31

Annex D – Extended functions for the baseline coding model 32
D.1 Extensions of near-lossless coding 32
D.1.1 Near-lossless coding with visual quantizaion 32
D.1.2 Near-lossless coding with NEAR value re-specification 32
D.2 Extensions of prediction on baseline coding model 33
D.2.1 Initializations 33
D.2.2 Prediction correction 33
D.2.3 Symbol packing 33
D.2.4 Update variables 34
D.2.5 Run interruption sample encoding 35
D.2.6 Flow of encoding procedures 35
D.3 Extension of Golomb coding 35
D.3.1 Golomb code completion 36
D.3.2 Run interruption handling for qbpp=1 36

Annex E – Fixed length coding 37
E.1 Introduction 37
E.2 Fixed length coding 37

Annex F – Sample transformation for inverse colour transform 38
F.1 Inverse colour transform 38
F.2 Example and guideline (Informative) 39

Annex G – Compressed data format 41
G.1 General aspects of the compressed data format specification 41
G.1.1 Marker assignments 41
G.1.2 JPEG-LS preset parameters specification syntax 41

Annex H – Control procedures for extensions 48
H.1 Control procedure for encoding a restart interval 48
H.2 Control procedure for encoding a minimum coded unit (MCU) with fixed length code (FLC) 48

Annex I – Conformance tests 51
I.1 Test images 51
I.1.1 Source images 51
I.1.2 Compressed image data 51
I.1.3 Test image formats 51

Annex J – Patents 53
J.1 List of patents 53

Annex K – Bibliography 55