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Information technology — Computer graphics and image processing — Image Processing and Interchange (IPI) — Functional specification —

Part 2:

Programmer's imaging kernel system application program interface

Technologies de l'information — Infographie et traitement de l'image — Traitement de l'image et échange (IPI) — Spécification fonctionnelle —

Partie 2: Interface de programme d'application PIKS

Reference number
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Foreword

ISO (the International Organization for Standardization) and IEC (the International Electrotechnical Commission) form the specialized system for worldwide standardization. National bodies that are members of ISO or IEC participate in the development of International Standards through technical committees established by the respective organization to deal with particular fields of technical activity. ISO and IEC technical committees collaborate in fields of mutual interest. Other international organizations, governmental and non-governmental, in liaison with ISO and IEC, also take part in the work.

In the field of information technology, ISO and IEC have established a joint technical committee, ISO/IEC JTC 1. Draft International Standards adopted by the joint technical committee are circulated to national bodies for voting. Publication as an International Standard requires approval by at least 75 % of the national bodies casting a vote.

International Standard ISO/IEC 12087-2 was prepared by Joint Technical Committee ISO/IEC JTC 1, *Information technology*, Subcommittee SC 24, *Computer graphics and image processing*.

ISO/IEC 12087 consists of the following parts, under the general title *Information technology — Computer graphics and image processing — Image processing and interchange (IPI) — Functional specification*:

— *Part 1: Common architecture for imaging*

— *Part 2: Programmer's imaging kernel system application program interface*

— *Part 3: Image Interchange Facility*

Annexes A, G, H and J form an integral part of this part of ISO/IEC 12087. Annexes B, C, D, E, F, K and L are for information only.

Information technology — Computer graphics and image processing — Image Processing and Interchange (IPI) — Functional specification —

Part 2:
Programmer's imaging kernel system application program interface

1 Scope

This part of ISO/IEC 12087 establishes the specification of the application program interface (API), called the Programmer's Imaging Kernel System (PIKS). ISO/IEC 12087-1 establishes the conceptual and architectural definitions of the Common Architecture for Imaging (CAI). ISO/IEC 12087-3 establishes the specification of the Image Interchange Facility (IIF).

PIKS is intended to provide a rich set of both low-level and high-level services on image and image-derived data objects. These services can be used as building blocks for a broad range of common imaging applications.

A conscious effort has been made by the developers of PIKS to create a standard that does not favor any particular computing system. Implementations of PIKS should be possible on computing systems ranging in architecture from general purpose computers to specialised hardware accelerators, ranging in size from personal computers to mainframe supercomputers, and ranging in connectivity from stand-alone machines to distributed computing networks.

Where applicable, PIKS relies on other APIs and data format standards to provide capabilities that are not unique to imaging. The following lists contain a summary of technological capabilites provided by PIKS and not provided by PIKS. However, it should be noted that PIKS functionality may be useful as a pre-processor or co-processor for many of the technologies in the "Not provided by PIKS" list.

Provided by PIKS

image analysis
image classification (basic)
image enhancement
image interchange between PIKS and an application
image interchange between PIKS and the IIF
image manipulation primitives
image processing data object generation tools (e.g., image filter functions)
image restoration
image visualization (basic)
standard colour models

Not provided by PIKS

audio
computer graphics
device control
image acquisition
image communication
image compression and decompression
image display
image transport between applications
image understanding
multimedia
pattern recognition
specific implementations
video
window systems

NOTE – The Image Interchange Facility of ISO/IEC 12087-3 specifies image compression and decompression functionality and image transport between applications and between an application and PIKS.

2 Normative references

The following standards contain provisions which, through references in this text, constitute provisions of this part of the ISO/IEC 12087. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this part of ISO/IEC 12087 are encouraged to investigate the possibility of applying the most recent standards indicated below. Members of IEC and ISO maintain registers of currently valid International Standards.

ISO/IEC 12087-1:—[1)], *Information technology — Computer graphics and image processing — Image Processing and Interchange (IPI) — Functional specification — Part 1: Common Architecture for Imaging.*

ISO/IEC 12087-3:—[1)], *Information technology — Computer graphics and image processing — Image Processing and Interchange (IPI) — Functional specification — Part 3: Image Interchange Facility.*

1) to be published.

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3 Symbols and abbreviations

The following are symbols and abbreviations utilized in this standard. The mathematical functions are defined in Annex A.

0D	zero-dimensional
1D	one-dimensional
2D	two-dimensional
3D	three-dimensional
4D	four-dimensional
5D	five-dimensional
ACOS	arc cosine function
AND	logical AND operator
API	Application Program Interface
ASIN	arc sine function
ASSIGN	index assignment function between image and operator input indices
ASN.1	abstract syntax notation one
ATAN	arc tangent function
ATAN2	arc tangent ratio function
b	spectral band index of an image
B	image spectral band size
BD	Boolean data type (PIKS internal)
BER	basic encoding rules
BI	external Boolean pixel data type
BITEXT	bit extraction function
BITINS	bit insertion function
BP	Boolean data type (PIKS parameter)
CAI	Common Architecture for Imaging
CAS	Hartley cas function
CCIR	Comite Consultatif International des Radiocommunications
CD	complex arithmetic data type (PIKS internal)
CF	external complex floating point pixel data type
CHAIN	chain data object
CHOICE	choice function

CIE	Commission Internationale de l'Eclairage
COLR	colour image
CONJ	complex conjugate function
COS	cosine function
CP	complex arithmetic data type (PIKS parameter)
CS	character string data type
D	single operator output image
DET	determinant of matrix argument
DOB	destination non-image object
Dq	q-th operator output image, $1 \leq q \leq Q$
DST	single destination image
DSTq	q-th destination image, $1 \leq q \leq Q$
EBU	European Broadcasting Union
EP	enumerated parameter
ERF	Gaussian error function
EXP	exponential function
EXT	external data type
GEN	generic image
HIST	histogram data object
i	square root of minus one, $i = \sqrt{-1}$
ID	data object identifier (PIKS internal)
ID_ARRAY	composite image identifier array
ID_LIST	composite image identifier list
ID_RECORD	composite image identifier record
IEC	International Electrotechnical Commission
IEEE	Institute Electrical and Electronic Engineers
IIF	Image Interchange Facility
IMAG	imaginary part of complex number argument function
in	input parameter
IP	data object identifier (PIKS parameter)
IPI	Image Processing and Interchange
ISO	International Organisation for Standardisation

j	first operator index
J	first operator index size
k	second operator index
K	second operator index size
l	third operator index
L	third operator index size
LIV	lowest integer value of argument function
LOG	base e natural logarithm function
LOOK	lookup table function
LUT	lookup table data object
m	fourth operator index
M	fourth operator index size
MATRIX	matrix data object
MAX	maximum of argument sequence function
MIN	minimum of argument sequence function
MOD	modulus function
MON	monochrome image
n	fifth operator index
N	fifth operator index size
NA	not applicable
NAND	logical NAND operator
NBHOOD_ARRAY	neighbourhood array data object
ND	non-negative integer data type (PIKS internal)
NI	external non-negative integer pixel data type
NIV	nearest integer value of argument function
NOR	logical NOR operator
NOT	logical NOT operator
NP	non-negative integer data type (PIKS parameter)
NTSC	National Television Systems Committee
NULL	null data type
OR	logical OR operator
out	output parameter