Digital Photography VII Best Paper
Sponsored by Fairchild Imaging
Improved Motion Invariant Imaging with Time Varying Shutter Functions
Steve Webster and Andrew Dorrell
Canon Information Systems Research Australia (Australia)

Abstract: In motion invariant photography, blur is introduced by a structured movement of the camera during capture. The structured movement results in a uniform blur which simplifies deblur through post-processing for objects moving at different speeds in a single motion plane. However, motion invariance depends on the camera speed exceeding the object speed (in the image plane) by a significant amount. This can lead to noisy image results and may be a problem for implementation of the method in practice. We propose the introduction of a time varying shutter transmittance to this recently proposed computational imaging method and demonstrate through simulation how this can improve both the degree of motion invariance and the reconstructed image quality, despite a reduction in optical efficiency. Improvements in the order of 6dB are demonstrated for the reconstructed, deblurred images in the presence of moderate noise. The work has the potential to bring motion invariant photography closer to use in real camera products.

Document Recognition and Retrieval 2011
Best Student Paper
Sponsored by Xerox Corporation
Introduction of Statistical Information in a Syntactic Analyzer for Document Image Recognition
André O. Maroneze and Bertrand Coïfasnon, INSA, and Aurélie Lemaître, University of Rennes (France)

Abstract: This paper presents an improvement to document layout analysis systems, offering a possible solution to Sayre’s paradox (which states that an element “must be recognized before it can be segment-
ed; and it must be segmented before it can be recognized”). This improvement, based on stochastic parsing, allows integration of statistical information, obtained from recognizers, during syntactic layout analysis. We present how this fusion of numeric and symbolic information in a feedback loop can be applied to syntactic methods to improve document description expressiveness. To limit combinatorial explosion during exploration of solutions, we devised an operator that allows optional activation of the stochastic parsing mechanism. Our evaluation on 1250 hand-written business letters shows this method allows the improvement of global recognition scores.

**Image Quality and System Performance VIII**

**Best Student Paper**

**Image Quality Metrics for the Evaluation of Print Quality**

Marius Pedersen¹, Nicolas Bonnier², Jon Y. Hardeberg³ and Fritz Albregtsen⁴, ¹Gjøvik University College (Norway); ²Océ Print Logic Technologies SA (France); and ³University of Oslo (Norway)

**Abstract:** Image quality metrics have become more and more popular in the image processing community. However, so far, no one has been able to define an image quality metric well correlated with the percept for overall image quality. One of the causes is that image quality is multi-dimensional and complex. One approach to bridge the gap between perceived and calculated image quality is to reduce the complexity of image quality, by breaking the overall quality into a set of quality attributes. In our research we have presented a set of quality attributes built on existing attributes from the literature. The six proposed quality attributes are: sharpness, color, lightness, artifacts, contrast, and physical. This set keeps the dimensionality to a minimum. An experiment validated the quality attributes as suitable for image quality evaluation.

The process of applying image quality metrics to printed images is not straightforward, because image quality metrics require a digital input. A framework has been developed for this process, which includes scanning the print to get a digital copy, image registration, and the application of image quality metrics. With quality attributes for the evaluation of image quality and a framework for applying image quality metrics, a selection of suitable image quality metrics for the different quality attributes has been carried out. Each of the quality attributes has been investigated, and an experimental analysis carried out to find the most suitable image quality metrics for the given quality attributes. For the many attributes metrics based on structural similarity are the the most suitable, while for other attributes further evaluation is required.

**Multimedia on Mobile Devices 2011 Best Paper**

**Local Polynomial Approximation — Local Binary Pattern (LPA-LBP) Based Face Classification**

Rakesh Mehta, Jirui Yuan, and Karen Egiazarian, Tampere University of Technology (Finland)

**Abstract:** In literature of face recognition many methods have been proposed which extract features at multiple scales for robust classification. In this paper, we proposed a novel method which utilizes Local Polynomial Approximation (LPA) techniques to capture the directional information of the face image at different scales. LPA based filters are used to obtain directional faces from the normalized face images at multiple scales. Since face image is spatially varied and classification works better when local descriptors are used, we incorporate Local Binary Pattern (LBP) operator to obtain LPA-LBP maps. Blockwise processing is done on LPA-LBP maps to capture the local regional relation among the pixels. Then, finally, Support Vector Machine (SVM) classifier is learned in LPA-LBP feature space for face classification. The final descriptor contains information extracted from different levels and, thus, results in high classification accuracy of the faces. Experiments done on Yale and ORL datasets demonstrate that the proposed method has higher classification accuracy than previously proposed methods.

**Multimedia on Mobile Devices 2011 Best Student Paper**

**Comparative Study of Autostereoscopic Displays for Mobile Devices**

Atanas Boev and Atanas Gotchev, Tampere University of Technology (Finland)

**Abstract:** We perform comparative analysis of the visual quality of multiple 3D displays—

To learn about all upcoming IS&T meetings, go to [www.imaging.org/ist/conferences/](http://www.imaging.org/ist/conferences/)

For a complete list of imaging-related meetings, go to [www.imaging.org/ist/conferences/events.cfm](http://www.imaging.org/ist/conferences/events.cfm)
This year IS&T and SPIE held the 22nd annual Symposium on Electronic Imaging (EI), a tribute to its early advocate Len Ravich, who had the foresight to urge both societies to explore the new imaging science from the earliest days of digital imaging. This year’s symposium comprised 23 separate technical conferences.

We report here on the longest standing of the conferences, Stereo Displays and Applications (SD&A). In its 22nd year, this conference is the largest technical conference on stereoscopic imaging. Its growth has been stimulated by the increasing use of 3D in many fields.

Included in the EI Symposium was the evening Demonstration Session, which began some years ago as a feature of the SD&A conference and has expanded to become a symposium-wide event.

The award of SPIE Fellowship to both John Merritt, founding chair of the SD&A Conference, and Lenny Lipton, major contributor to 3D technology and longtime SD&A participant, during this year’s Symposium, underscores the growing significance of the stereoscopic imaging field.

The 2011 SD&A conference, chaired by Andrew Woods, Nicholas Holliman, and Neil Dodgson, included technical presentations that ranged in content from techniques for recording and presenting 3D imaging to visual perception of 3D images and quality of the stereoscopic viewing experience. In addition to three and a half days of papers sessions, poster presentations were shared as an adjunct to the evening Demonstration Session.

The SD&A sessions included two keynote addresses and two panel discussions. In the first keynote address, Matt Cowan, CTO of RealD, presented an excellent discussion of the fine points of RealD 3D cinema technology. The second keynote speaker was Ramesh Raskar, who leads the MIT Media Lab’s Camera Culture research group. He described innovative work on 6D displays that produce super-realistic 2D images. A panel discussion led by Lenny Lipton addressed concerns about the impact of 3D television viewing. A second discussion forum, led by Bernard Mendiburu, considered the screen size factor in 3D content production and presentation.

In addition to its comprehensive papers and poster sessions, the conference hosted an exciting SD&A 3D Theater, produced by Andrew Woods and Chris Ward, from Lightspeed Design, USA. Open to all Symposium attendees, the 3D Theater comprised three-minute segments of 40 3D video presentations. Altogether it was an exciting representation of a wide variety of 3D subjects from many cultures, including video segments from Norway, Finland, Hong Kong, South Korea, Japan, Czech Republic, Greece, Australia, UK, and USA. Some segments were entered into competition; others were presented as demonstrations.

Competition entries were judged in three categories: live action, computer graphics imaging, and visual effects. In live action, Best of Show award went to “White Knuckles 3D” by OK Go (USA) and Honorable Mention to “Stereo Timelapse” by Takashi Sekitani, StereoEye (Japan). In computer graphics, Best of Show award went to “Fractal Odyssey” by John Hart and Jerry Oldaker (USA) and Honorable Mention to “Holy Moly” by Passmore Labs (USA). In visual effects, Best of Show award went to “Dead Boring” by Dave Edwards, AFTRS (Australia) and Honorable Mention to “Experiments in Stereoscopic Imaging” by iCinema (Australia).

In summary, the 2011 SD&A conference represented the latest advances worldwide in 3D imaging technology and content. Planning for the 2012 SD&A Conference is well under way. For more information on SD&A, see www.stereoscopic.org.

The EI2012, which includes the 2012 SD&A Conference, will be held January 22-26 at the Hyatt Regency San Francisco Airport Hotel. See www.electroniceimaging.org for details.

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**Highlights from EI’s SD&A Conference**

by Vivian Walworth

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**EI2011 STATS**

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**IS&T REPORTER**

Executive Editor: Peter Burns
Managing Editor: Donna Smith
Standards Editor: David McDowell

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Imaging.org focuses on all aspects of imaging, with particular emphasis on digital printing, electronic imaging, image perception, photo fulfillment, color imaging, image preservation, digital fabrication, and the physics and chemistry of imaging processes. For more information, visit imaging.org. IS&T publishes the Journal of Imaging Science & Technology and (with SPIE) Journal of Electronic Imaging.

Please send inquiries to: info@imaging.org
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This issue of the Standards Update is a mélange of information about the upcoming meetings of ISO TC42 (Photographic) and ISO TC130 (Graphic technology) and some recent announcements from ISO that are of interest to the imaging community.

**TC42 Photography**

TC42 will hold both Working Group meetings and a Plenary, June 6-10, in Rochester, NY. The WGs that will meet include:

- **WG3** - Sensitometry, image measurement and viewing,
- **WG5** - Physical properties and image permanence of photographic materials,
- **WG6** - Joint TC42-TC6 WG: Photography, graphic film and paper products – Dimensions,
- **WG8** - Joint TC42-TC6 WG: Photographic film and paper products –
- **WG9** - Still projectors and transparencies
- **WG12** - Postpress
- **WG13** - Printing certification requirements
- **WG17** - Revision of ISO 3665
- **WG18** - Dimensions, Digital still cameras
- **WG19** - Electronic still picture imaging,
- **WG20** - Colour characterization of digital still cameras
- **WG21** - Densitometry
- **WG22** - Colour measurement and management, Convener
- **WG23** - Extended colour encodings,
- **WG24** - Viewing conditions
- **WG25** - XMP standards for photography

TC42 has several other WGs whose work is at a point that meetings are not needed at this time or they are in Standby mode. They are:

- **WG4** - Mechanical Elements & Photographic Equipment
- **WG6** - Photographic chemicals and processing,
- **WG9** - Still projectors and transparencies
- **WG10** - Management of security printing processes
- **WG11** - Environmental impact of printed products
- **WG12** - Postpress
- **WG13** - Printing certification requirements
- **WG14** - Digital Photography
- **WG15** - Certified reference materials
- **WG16** - Image permanence
- **WG17** - Revision of ISO 3665
- **WG18** - Dimensions, Digital still cameras
- **WG19** - Electronic still picture imaging,
- **WG20** - Colour characterization of digital still cameras
- **WG21** - Densitometry
- **WG22** - Colour measurement and management, Convener
- **WG23** - Extended colour encodings,
- **WG24** - Viewing conditions
- **WG25** - XMP standards for photography

**US Involvement**

Every National Body in ISO has some form of shadow committee to provide input to the International Standards activities. In the US, our official representative to ISO is ANSI. To facilitate the work of providing input to the various TCs, ANSI has created a US Technical Advisory Group (USTAG) for each ISO TC in which the US (ANSI) participates. The user community is responsible for the support (and often administration) of these USTAGs.

It is the USTAG to each TC that is responsible for providing US technical experts and determining the US position on standards of that TC.

The USTAG to TC42 is organized by areas of interest into Imaging Technology (IT) committees, which are:

- **IT2** – Image Evaluation
- **IT9** – Image Permanence
- **IT10** – Digital Photography

ISO members based in the United States can participate in the development of accredited international photography standards by joining the appropriate IT committee.

For more information about TC42 related standards or for IT Standards Committee Application Forms please go to www.imagining.org/ist/resources/standards.

**TC130 Graphic Technology**

TC130 is the ISO Committee responsible for standards involving printing and publishing. It will be holding Working Group meetings in Berlin, April 11-16.

The Working Groups that are scheduled to meet include:

- **WG1** - Terminology
- **WG2** - Prepress data exchange
- **WG3** - Process control and related metrology
- **WG4** - Media and materials
- **WG10** - Management of security printing processes
- **WG11** - Environmental impact of printed products
- **WG12** - Postpress
- **WG13** - Printing certification requirements

TC130 has several other WGs whose work is at a point that meetings are not needed at this time or they are in Standby mode. They are:

- **WG5** - Ergonomics - Safety
- **JWG6** - Certified reference materials
- **JWG7** - Colour management
- **JWG8** - Revision of ISO 13655
- **JWG9** - Development of ISO 12640-5

Of particular interest will be the work of WG2/TF4 where the results of the recent Fast Track which approved ISO 16641, Graphics technology — Extensible metadata platform (XMP) specification — Part 1: Data model, serialization and core properties, will be reviewed

For more information about TC130 and the USTAG to TC130 please go to http://npes.org/standards/workroom.htm or contact mcdowell@npes.org.

**Other ISO Announcements**

ISO regularly publishes announcements of activities or documents that represent noteworthy achievement in the standards world. In reviewing a recent list of these announcements I felt that it would be worthwhile to summarize some of them in the Standards Update to pique your interest.

**Best-selling ISO standards now available in e-book formats**

A selection of ISO’s best-selling standards, such as ISO 9001 (quality management), ISO 31000 (risk management) and ISO/IEC 27001 (information security management), are now available in formats compatible with the most popular e-book readers.

In addition to paper and PDF, purchasers can now choose from the following formats:

- Standard ePub format, compatible with most e-book readers such as the Sony Reader, Barnes and Noble Nook, etc.
- ePub format optimized for Apple’s iPad and iPhone, which allows the
full use of the functionalities of these
devices
• Mobipocket format, compatible with
Amazon’s Kindle.
The selection of e-book compatible
standards is available in both English and
French for the same price as the standards
in PDF format.

How business leaders increase competitive advantage by using standards
ISO and its partners the International
Electrotechnical Commission (IEC) and
the International Telecommunication
Union (ITU) have launched a new elec-
tronic newsletter providing concrete ex-
amples of how standards impact the bot-
tom line, stimulate economic growth,
productivity and innovation and allow
businesses large and small to access
broader markets.

The newsletter goes out under the
banner of the World Standards Coopera-
tion (WSC) which the three organizations
established in 2001 in order to strengthen
and advance the voluntary consensus-
based international standards systems of
IEC, ISO and ITU.

The first issue of the WSC eNewsletter
includes the following success stories:
• How Tyco Electronics achieved addi-
tional profits of USD +50 million by par-
ticipating in standardization
• Why the former CEO of Mitsubishi
believes that standardization and cer-
tification are now crucial for Japanese
companies’ continued success
• Why the CEO of Rockwell, the
world’s largest automation company,
recommends that businesses partici-
pate in standardization work
• How a 50-employee SME succeeded
in opening up the European market
for its medical devices
Order or download your free infor-
mation package that summarizes all the
benefits of using International Standards
and participating in their development.

The WSC eNewsletter will be pub-
lished three times a year. A subscription
form is available at www.worldstandards-
cooperation.org

New ISO specification will increase transparency and reliability of credit assessments
Service credit bureaus and their customers
who seek to operate in an international
market now have a valuable tool in a new
ISO technical specification which offers a
harmonized, more transparent and more
reliable approach to assessing the credit-
worthiness of companies.
ISO/TS 10674:2011, Rating services –
Assessment of creditworthiness of non-list-
ed entities, provides common terms, defi-
nitions and basic process requirements for
the assessment of creditworthiness (“Is the
company worthy of having credit extend-
ed to it?”).

Extending credit to companies is a
common component of business today. How-
ever, for small and medium-sized en-
terprises (SMEs) in particular, the decision
to extend credit can involve numerous fi-
nancial concerns. These concerns need to
be answered beforehand to avoid a host of
problems afterward—which begs the ques-
tion: “Is credit assessment reliable?”

In view of the increasing number of
credit assessment service organizations,
each with its individual assessment sys-
tem, there is now a clear need for a com-
mon evaluation and commu-
nication tool—which is answered by the new ISO tech-
nical specification.
ISO/TS 10674:2011, was prepared by
ISO/PC 235, Rating services. It costs 66
Swiss francs and is available from ISO na-
tional member institutes (see the complete
list with contact details) and from ISO
Central Secretariat through the ISO

No more squinting at small print or
leaning forward to hear
Feel like you’re getting old simply because
you need to squint to see the small print or
can’t properly hear a signal coming from
your new computer? Think twice. The prob-
lem may not be your age but a flaw in design.

Two new ISO International Standards
will help make products, signs and dis-
plays more accessible to older persons and
those with disabilities – and the rest of us.
They offer technical information, data and
ergonomic know-how for visual and audi-
tory design that addresses the needs of
these often overlooked members of the
population.

The first “solution document” is a new
standard, ISO 24502:2010, Ergonomics –
Accessible design – Specification of age-re-
lated luminance contrast for coloured light.
It specifies a method of calculation that
can be applied to the design of visual signs
and displays, so that they are clearly visible
to older people, although the luminance
contrast can be applied to people aged
from 10 to 79 years of age.

For example, increasing the contrast
d (especially for blue light), size and overall
visibility of sign displays or integrating
features such as oversized monitors or
large character display fonts as part of
product design can greatly help people
with visual difficulties.

The second standard, ISO 24501: 2010,
Ergonomics – Accessible design – Sound pressure levels of auditory signals for
consumer products, aims to determine an
appropriate sound level range of auditory
signals, so that all users, including people
with age-related hearing loss, can hear
them properly against interfering sounds.

The two standards are part of a set of
accessible design suite that help make ac-
cessible products, services and environ-
ments encountered in all aspects of daily
life, as well as in the consumer market.
They adopt the principles of accessible de-
sign presented in ISO/IEC Guide 71:2001,
Guidelines for standards developers to ad-
dress the needs of older persons and per-
sons with disabilities.

For suggestions for (or input to) future up-
dates, or standards questions in general,
please contact the editor at mcdowell@
npes.org.
seven portable ones, and a large 3D television set. We discuss two groups of parameters that influence the perceived quality of mobile 3D displays. The first group is related with the optical parameters of the displays, such as crosstalk or size of sweet spots. The second group includes content related parameters, such as objective and subjective comfort disparity range, suitable for a given display. We identify eight important parameters to be measured, and for each parameter we present the measurement methodology, and give comparative results for each display. Finally, we discuss the possibility of each display to visualize down-scaled stereoscopic HD content with sufficient visual quality.