Multimedia Systems Laboratory

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Refereed academic journal

[jpshin-303-011-01:2015] Jungpil Shin Hiroshi Kanno. Personal Identification using Face Images. *International Journal of Applied Engineering Research (IJAER)*, 10(79):101–105, Oct 2015.

The purpose of this research is to create a Personal Identification using Face Images that demand high accuracy for security systems. The results of the experiments using three methods: Shade Value Matching, Structural Analysis Technique, and Comparing HSV information were the rate of accepting original image was 95.0another image was 100.0with the weights of the images. Structural Analysis Technique uses the features which are the ratio of the length of the components based on the eye width. Comparing HSV information is comparing Hue and Saturation of the images using color information. We can compare the registered image with the input image with the shade value, the relative lengths, and color information using these three methods.

[jpshin-303-011-02:2015] Keunsoo Yun Jungpil Shin. Synthesis of Handwritten Style and Cursive English Font Reflected Personality. *International Journal of Applied Engineering Research (IJAER)*, 10(79):357–361, Oct 2015.

People want to use a font that reflects the users personality because fonts used on the internet and the word processor lack personality. However, it is very difficult to generate a font with personality. This paper shows the generation method of all lowercase characters from a small number of characters input by the user. First, this method achieves the small number of input characters through the compression of a large number of strokes by vector quantization. Second, the connection between characters could be represented by using the Bezier curve. The burden of the user is minimized because many input characters are not required. Finally, the subjective evaluation and objective evaluation of this system are conducted by the subjects. The user's personality in the generated characters shows good results.

[jpshin-303-011-03:2015] Jungpil Shin Kazunari Soma. Fuzzy Rules Method for On-Line Signature Evaluation. *International Journal of Applied Engineering Research (IJAER)*, 10(79):111–114, Oct 2015.

In this paper, we consider algorithm of signature evaluation by using fuzzy rules. Characteristic features which signatures have can be treated by using fuzzy rules. We define which signature has the characteristic features and eval-

uate references in signature verification system. And there is experiment that how high-rated signatures affect in signature verification system. A database which has 22 people's signatures is used. It consists of 40 true signatures and 40 fake signatures by four people. In this research, altitude and azimuth are focused on and considered by altitude, orientation, average of orientation, coefficient of variance of altitude, coefficient of variance of orientation. These five parameters are fuzzified and compared. In experiments, two kinds of signatures are compared. One is that the signature scored higher, and another is that the signature scored lower. Signatures which scored higher mean that they have characteristic. The average of these gained better score than others.

[jpshin-303-011-04:2015] Jungpil Shin Syouko Ootsuka. Face Detection Algorithm using Facial Features and Geometrical Positions. *International Journal of Applied Engineering Research (IJAER)*, 10(79):106–110, Oct 2015.

In this paper we present a novel method to detect human faces, which the sizes, positions and directions are unknown. Human face detection plays an important role in applications such as video surveillance, human computer interface, face recognition, and face image database management. When the face is in profile or occluded, it is difficult to detect faces, so this method addresses the problem. First, facial features are extracted from the skin-colored area and each candidate is estimated using the geometrical position of facial features. This Geometrical Position is the most important method to solve the problem of a profile and occlusion. Also, the circle of the face boundary is detected using Circular Hough Transform. Experimental results demonstrate successful face detection over a wide range of facial variation in color, position, scale, orientation, pose, and occlusion in images from several photo collections.

[naru-303-011-01:2015] T. Mizuno, T. Kase, T. Shiina, M. Mita, N. Namiki, H. Senshu, R. Yamada, H. Noda, H. Kunimori, N. Hirata, F. Terui, and Y. Mimasu.

[naru-303-011-02:2015] R. Yamada, H. Senshu, N. Namiki, T. Mizuno, S. Abe, F. Yoshida, H. Noda, N. Hirata, S. Oshigami, H. Araki, Y. Ishihara, and K. Matsumoto.

[naru-303-011-03:2015] S. Yamamoto, R. Nakamura, T. Matsunaga, Y. Ogawa, Y. Ishihara, T. Morota, N. Hirata, M. Ohtake, T. Hiroi, Y. Yokota, and J. Haruyama. Global occurrence trend of high-Ca pyroxene on

lunar highlands and its implications. *Journal of Geophysical Research: Planets*, 120(5):831–848, 2015.

We present details of the global distribution of high-Ca pyroxene (HCP)-rich sites in the lunar highlands based on the global data set of hyperspectral reflectance obtained by the SELENE Spectral Profiler. Most HCP-rich sites in the lunar highlands are found at fresh impact craters. In each crater, most of the detection points are distributed on the ejecta, rim, and floor of the impact craters rather than the central peaks, while the central peaks are dominated by purest anorthosite (PAN). This indicates that HCP-rich materials originate from relatively shallower regions of the lunar crust than PAN. In addition, while all ray craters with sizes larger than -40 km possess HCP-rich materials, small fresh craters with sizes less than -6-10 km do not, indicating that the uppermost mixing layers in the lunar crust are not dominated by HCP. Based on these results, we propose that in the upper lunar crust, a HCP-rich zone overlying the PAN layer exists below the uppermost mixing layer. This HCP-rich zone may originate from interstitial melt during the formation of the flotation anorthositic cumulate, while an impact ejecta origin, impact melt origin, and/or magmatic intrusion into the upper lunar crust may also account for the occurrence of HCP-rich sites in the highlands.

[naru-303-011-04:2015] S. Yamamoto, R. Nakamura, T. Matsunaga, Y. Ogawa, Y. Ishihara, T. Morota, N. Hirata, M. Ohtake, T. Hiroi, Y. Yokota, and J. Haruyama. Featureless spectra on the Moon as evidence of residual lunar primordial crust. *Journal of Geophysical Research: Planets*, 120(12):2190–2205, 2015.

We report the global distribution of areas exhibiting no absorption features (featureless or FL) on the lunar surface, based on the reflectance spectral data set obtained by the Spectral Profiler onboard Kaguya/SELENE. We found that FL sites are located in impact basins and large impact craters in the Feldspathic Highlands Terrane, while there are no FL sites in the Procellarum regions nor the South Pole-Aitken basin. FL sites in each impact basin/crater are mainly found at the peak rings or rims, where the purest anorthosite (PAN) sites are also found. At the local scale, most of the FL and PAN points are associated with impact craters and peaks. Most of the FL spectra show a steeper (redder) continuum than the PAN spectra, suggesting the occurrence of space weathering effects. We propose that most of the material exhibiting a FL spectrum originate from space weathered PAN. Taking into account all the occurrence trends of FL sites on the Moon, we propose that both the FL

and PAN materials were excavated from the primordial lunar crust during ancient basin formations below the megaregolith in the highlands. Since the FL and PAN sites are widely distributed over the lunar surface, our new data may support the existence of a massive PAN layer below the lunar surface.

[naru-303-011-05:2015] Y. Hayashi, Y. Ogawa, N. Hirata, J. Terazono, H. Demura, T. Matsunaga, S. Yamamoto, Y. Yokota, M. Ohtake, and H. Otake. Web GIS system Gekko for data analysis of Kaguya's Spectral Profiler. *Journal of Space Science Informatics Japan*, pages 91–103, 2015.

We developed a web GIS system

Refereed proceedings of an academic conference

[jpshin-303-011-05:2015] Jungpil Shin Chin-Ling Chen, Chien-Hung Chen. An Illegal Behavior Unmasked System via Subliminal Channel. In *2015 International Conference on Applied System Innovation (ICASI 2015)*, pages 188–190, Osaka, Japan, May 2015. Taiwanese Institute of Knowledge Innovation (TIKI), Taiwanese Institute of Knowledge Innovation (TIKI).

With the rapid development of the Internet, the number of criminal cases has greatly increased. Therefore, determining how to avoid and reduce illegal behaviors has become an important issue, for exam-ple: illegal insider trading of enterprises, commercial spying, etc. In this paper, we propose a novel scheme to protect investigators' safety and ensure the security of the collected evidence via a subliminal channel. We employ a cryptographic mechanism to solve the non-repudiation, integrity and authentication issues. Our scheme not only protects investigators' identity and safety but also constitutes a fair arbitration mechanism.

[jpshin-303-011-06:2015] Jungpil Shin Hiroshi Kanno. Personal Identification using Face Images. In Jong Yun LEE, editor, *International Conference on Convergence Technology (ICCT2015)*, pages 770–771, Hokkaido, Japa, June 2015. Korea Convergence Society, Korea Convergence Society.

This paper describes a personal identification using face images with 3 methods, namely, Shade Value Matching, Structural Analysis Technique, and Color Element Matching. The purpose of this research is creating Personal Identification using Face Image and demanding high accuracy in order to realize the security system which is reliable. Extracting important components in the input

image is Success. As experimental result we can obtain that the rate of accepting originals is 95.0matching, structural analysis technique, and color element matching.

[jpshin-303-011-07:2015] Jungpil Shin Kazunari Soma. Fuzzy Rules Method for On-Line Signature Evaluation. In Jong Yun LEE, editor, *International Conference on Convergence Technology (ICCT2015)*, pages 772–773, Hokkaido, Japa, June 2015. Korea Convergence Society, Korea Convergence Society.

We present an algorithm of signature evaluation by using fuzzy rules. Characteristic features which signatures have can be treated by using fuzzy rules. We define which signature has the characteristic features and evaluate references in signature verification system. A database which has 22 people's signatures is used. It consists of 40 true signatures and 40 fake signatures by 4 people. In this research, altitude and azimuth are focused on and considered by altitude, orientation, average of orientation, coefficient of variance of altitude, coefficient of variance of orientation. These 5 parameters are fuzzified and compared. In experiments, two kinds of signatures are compared. One is that the signature scored higher, and another is that the signature scored lower. Signatures which scored higher mean that they have characteristic. The average of these gained better score than others.

[jpshin-303-011-08:2015] Keunsoo Yun Jungpil Shin, Takase Yoshiaki. Synthesis of Handwritten Style Cursive English Font. In Jong Yun LEE, editor, *International Conference on Convergence Technology (ICCT2015)*, pages 774–775, Hokkaido, Japa, June 2015. Korea Convergence Society, Korea Convergence Society.

This paper shows the generation method of all lowercase characters from small number of the characters that is inputted by the user. People want to use a font reflected the user's personality because the fonts used in the internet and the word processor are lack of personality. However it is very difficult to generate a font privately. First we achieves the small number of inputted characters because many strokes compressed by vector quantization. Second, the connection of between characters could be represented by using Bezier curve. The burden of the user is minimized because many inputting characters are not needed. Finally, the subjective evaluation and objective evaluation about this system are conducted with the subjects. The user's personality of the generated characters shows effective results.

[jpshin-303-011-09:2015] Jungpil Shin Syouko Ootsuka. Face Detection Algorithm using Facial Features and Geometrical Positions. In Jong Yun LEE, editor, *International Conference on Convergence Technology (ICCT2015)*, pages 776–777, Hokkaido, Japa, June 2015. Korea Convergence Society, Korea Convergence Society.

In this paper we present a novel method to detect human faces, which the sizes, positions and directions are unknown. Human face detection plays an important role in applications such as video surveillance, human computer interface, face recognition, and face image database management. First, facial features are extracted from the skin-colored area and each candidate is estimated using the geometrical position of facial features. This Geometrical Position is the most important method to solve the problem of a profile and occlusion. Experimental results demonstrate successful face detection over a wide range of facial variation in color, position, scale, orientation, pose, and occlusion in images from several photo collections.

[jpshin-303-011-10:2015] Zhaofeng Liu Jungpil Shin. Writer Identification Method using Inter and Intra-Stroke Information. In Claus-Peter Ruckemann, editor, *The Fifth International Conference on Advanced Communications and Computation (Infocomp2015)*, pages 80–83, Brussels, Belgium, Oct 2015. The International Academy, Research and Industry Association (IARIA), The International Academy, Research and Industry Association (IARIA).

Most research in the field of writer identification currently uses positional data to identify the writer. But there is no writer identification method that is suitable for practical use so far. So, we newly devise two algorithms to raise accuracy rate and find some parameters that have beneficial effects on writer identification. One algorithm is Block Type Model which is a method to analyze positional relation and shapes of Chinese characters. The other algorithm is Hidden feature analysis which is an algorithm that identifies the writer using multi-parameters with all the strokes. As a result, any eight Chinese characters were enough to achieve over 99.9discovered that there are personal attributes in the speed of each stroke. With the new algorithm, we raised accuracy rate and found out that parameters have beneficial effects on writer identification.

[jpshin-303-011-11:2015] Takayuki Nakamura Jungpil Shin. The Educational Effect of Schoolchildren's Use of Chinese Character e-Learning Systems. In R. Ryu, editor, *The 8-th International Conference on the Frontiers of Information Technology, Application and Tools (FITAT2015)*, pages

154–157, Jilin, China, July 2015. Northeast Dianli University, Northeast Dianli University.

In this study, a Chinese character e-learning system was developed so that grade-schoolers and foreigners living in Japan could study Chinese characters in an enjoyable way. The system was created by comparing learning methods to read and write Chinese characters through e-learning systems and conventional paperbased methods. The function that indicates whether a character is written correctly, and the function that displays an animation of the correct writing method, helped learners achieve their learning goals. The learning outcome focused on changes in the percentage of correct answers on a test and increase in learning efficiency, and further experiments were conducted by changing the number of times students wrote letters using the e-learning system.

[jpshin-303-011-12:2015] Jungpil Shin Tsukada Youji. Kanji Learning System for Portable Devices. In *The 15th The International Conference on Computers, Communications and Systems (ICCCS 2015)*, pages A1–01, Daegu Univ. Korea, Nov 2015. Daegu University, Daegu University.

Kanji has many meaning, some difficult pronunciation and the complex form. Therefore Japanese and foreigners in japan don't understand perfectly Japanese language. For this reason, we propose a Kanji learning system to be used in smartphone and table. The review is one of the importance learning methods. Users can learn a set of Kanji incorrectly written by this review function. Since nowadays Android is used mostly in the world, our Kanji learning system was developed in Android. Kanji learning system for portable devices was compared with conventional Kanji learning system by the dictation Kanji test. As a result of experiment, (1) a leaning effect of Kanji learning system for portable devices was higher than conventional Kanji learning system, (2) User can decrease incorrect answers after learning of Kanji by the review function, (3) Kanji of simple form and Kanji of complex form were decreased incorrect answers after learning of kanji by Kanji learning system for portable devices. An understanding was improved for users by Kanji learning system for portable devices.

[jpshin-303-011-13:2015] Jungpil Shin Ui Pil Chong Md Saiful Islam, Jung Chul Lee. Data Analysis of Automated Monitoring System Based on Target Features. In Doo soon Park, editor, *The 7th International Conference on Computer Science and its Applications (CSA 2015)*, pages 154–157, Cebu, Philippines, Dec 2015. Springer, Springer.

Automated monitoring system provides a potential technique for monitoring

the indoor environment. Traditional automated monitoring systems are very expensive. This paper presents a cheap automated monitoring system which is based on the motion sensors and ultrasonic sensor. This automated monitoring system allows the users to access information directly on the web site through browser or Wireless Mobile Terminals at any time. Cross correlation is used to calculate the distance of targets using ultrasonic signal. We demonstrate the effectiveness of our system by analyzing the echo signals. We conducted a series of real-world experiments with different targets and target positions. Additionally, we did experiment and analyzed the ultrasonic signal between transmitter and receiver directly without echo signals. The experimental result shows the reliability of the system.

Research grants from scientific research funds and public organizations

[naru-303-011-06:2015] N. Hirata. Grants-in-Aid for Scientific Research (KAKENHI), 2013-2015.

Academic society activities

[jpshin-303-011-14:2015] Jungpil Shin, July 2015.

Program Committee, 2015 (held in Orlando, Florida, USA, on July 12 - 15, 2015)

[jpshin-303-011-15:2015] Jungpil Shin, June 2015.

Program Committee, (held in New York, USA, June 27 - July 2, 2015)

[jpshin-303-011-16:2015] Jungpil Shin, July 2015.

Program Committee, (held in Killarney, Ireland, July 12-17, 2015)

[jpshin-303-011-17:2015] Jungpil Shin, July 2015.

Program Chair (held in Jilin, China, July 20-23, 2015)

[jpshin-303-011-18:2015] Jungpil Shin, Aug 2015.

Program Committee, (held in in Istanbul, Turkey, August 2-5, 2015)

[jpshin-303-011-19:2015] Jungpil Shin, Nov 2015.

Program Committee, (held in Gyeongsan, Daegu University Korea. Nov. 6, 2015)

[jpshin-303-011-20:2015] Jungpil Shin, Dec 2015.

Editorial and Program Committee (held in Jeju, Korea, Dec 16-19, 2015)

[naru-303-011-07:2015] N. Hirata, 2015.

Chair of the committee for information system

[naru-303-011-08:2015] N. Hirata, 2013-2015.

Member of Program Subcommittee, and Editor of Proceedings

Advisor for undergraduate research and graduate research

[jpshin-303-011-21:2015] Tomoya Murata. Master Thesis: Character Input System using Fingertip Detection with Kinect Sensor, University of Aizu, Feb 2015.

Thesis Advisor: Jungpil Shin

[jpshin-303-011-22:2015] Tsukada Youji. Master Thesis: Keyboard Input by Movement of Finger and Pointer using Smart Device, University of Aizu, Feb 2015.

Thesis Advisor: Jungpil Shin

[jpshin-303-011-23:2015] Nirei Yuki. Graduation Thesis: User Identification using Leap Motion Controller, University of Aizu, Feb 2015.

Thesis Advisor: Jungpil Shin

[jpshin-303-011-24:2015] Ryosuke Motoki. Graduation Thesis: Writer Verification Based on 3D Handwritten Character, University of Aizu, Feb 2015.

Thesis Advisor: Jungpil Shin

[jpshin-303-011-25:2015] Naoaki Ishigami. Graduation Thesis: Signature Synthesis System Based on Emphasizing Individuality in Strokes, University of Aizu, Feb 2015.

Thesis Advisor: Jungpil Shin

[jpshin-303-011-26:2015] Takuya Souma. Graduation Thesis: Simulating Oriental Brush Character Considered With Aerial Action of Pen Tablet, University of Aizu, Feb 2015.

Thesis Advisor: Jungpil Shin

Scholarly paper prepared by undergraduate/graduate student(s) you advised

[jpshin-303-011-27:2015] Jungpil Shin Hiroshi Kanno. Personal Identification using Face Images. *International Journal of Applied Engineering Research (IJAER)*, 10(79):101–105, Oct 2015.

[jpshin-303-011-28:2015] Keunsoo Yun Jungpil Shin. Synthesis of Handwritten Style and Cursive English Font Reflected Personality. *International Journal of Applied Engineering Research (IJAER)*, 10(79):357–361, Oct 2015.

[jpshin-303-011-29:2015] Jungpil Shin Kazunari Soma. Fuzzy Rules Method for On-Line Signature Evaluation. *International Journal of Applied Engineering Research (IJAER)*, 10(79):111–114, Oct 2015.

[jpshin-303-011-30:2015] Jungpil Shin Syouko Ootsuka. Face Detection Algorithm using Facial Features and Geometrical Positions. *International Journal of Applied Engineering Research (IJAER)*, 10(79):106–110, Oct 2015.

Advisor of a student club or circle

[jpshin-303-011-31:2015] Advisor of EBS Circle

[jpshin-303-011-32:2015] Advisor of fhoto-grafia Circle

Contribution related to student management(for example, solution of a student-related problem)

[naru-303-011-09:2015] Class mentor

Contribution related to educational planning management

[jpshin-303-011-33:2015] Member of Patent Committee for University of Aizu

Contribution related to planning administration for research, research conferences, or international research

[jpshin-303-011-34:2015] Advisory Board of Center for Strategy of International Programs(CSIP)

[jpshin-303-011-35:2015] Invited Speaker in ICCCS 2015: 15th International Conference on Computers, Communications and Systems (ICCCS 2015), in Gyeongsan, Daegu University Korea. Nov. 6, 2015.

[naru-303-011-10:2015] Workshop on Analysis of Asteroid Exploration Data, Sept. 27th - 29th, 2015, University of Aizu

Did you participate in Public Lectures, and/or Open Campus? (Yes or No) If yes, please describe what you did.

[jpshin-303-011-36:2015] Presentation of the Demonstration Programs at the Open Campus Festival held at the University of Aizu on Aug. and October 2015

[naru-303-011-11:2015] exhibition in JpGU, 2015.5.24-28

[naru-303-011-12:2015] exhibition in Open Campus of the University of Aizu, 2015.8.9

[naru-303-011-13:2015] lecture in Ohtama Village, Fukushima, 2015.9.26

[naru-303-011-14:2015] exhibition in Open Campus of the University of Aizu, 2015.10.10-11

[naru-303-011-15:2015] lecture in Shirakawa Highschool, Shirakawa, Fukushima, 2015.11.2

[naru-303-011-16:2015] lecture in Fukushima Seikei Highschool, Fukushima, Fukushima, 2016.3.7

[naru-303-011-17:2015] lecture in Gakuho Ishikawa Highschool, Ishikawa, Fukushima, 2016.3.9

Research achievement that can be used for University-Industry collaboration and its characteristics.(for UBIC's information)

[jpshin-303-011-37:2015] Cursive Style Handwritten Character Synthesis System:1. Synthesizing cursive style characters with probabilistic and natural concatenation between strokes, while not restricting the number of strokes

[jpshin-303-011-38:2015] Kanji Learning System:Verification of educational effect of Kanji learning system for smartphone

[jpshin-303-011-39:2015] Writer Identification System: Enabling low cost writer identification using small number of handwritten character.

[jpshin-303-011-40:2015] Handwriting Recognition Drawn on Screen with Laser-pointer: Enabling the algorithm for Graffiti alphabet character and numeral character recognition.

[jpshin-303-011-41:2015] Simulating Oriental Brush Character Considered With Aerial Action of Pen Tablet: 1.By acquiring the z-coordinate of the pen, more delicate oriental brush characters are able to be expressed. 2.More natural scratchiness, diffusion of the oriental brush are able to be expressed.

[jpshin-303-011-42:2015] User Identification using Leap Motion Controller: 1.We can investigate (1) Inter information among finger joints and (2) Intra information of each finger, e.q. angle of finger joints. 2. The identification rate for 25 persons can be more than 95percent. 3.Goal: A person can be identified only by putting on top of leap motion. Only use the palm of one hand. 4. There is a low risk that we could be lost or stolen. It is used in substitution for a password of the computer.

[jpshin-303-011-43:2015] Character Input System using Fingertip Detection with Kinect Sensor: 1.Able to do quickly input-output of the character. 2.The system can use anyone 3.Increase the method of communication.

[jpshin-303-011-44:2015] Finger Alphabet Recognition for Character Input using Smart Device: This system can be input at a little away distance, because camera of the smart device is recognized fingertips. Users can input characters at a little away location.