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The International Conference on Big data, IoT, and Cloud Computing (BIC 2019)

# The International Conference on Big data, IoT, and Cloud Computing (BIC 2019)

August 19-21, 2019  
Jeju, Korea

**Organized by**

**KIPS CSWRG**



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**The 11th International Conference on Computer Science and its Applications  
(CSA 2019)**

- December, 18-20, 2019, Macao, China
- <http://www.csa-conference.org/2019>

**The 14th KIPS International Conference on Ubiquitous Information Technologies and Applications  
(CUTE 2019)**

- December, 18-20, 2019, Macao, China
- <http://www.cute-conference.org/2019>

## Message from the BIC 2019 General Chairs

The 2019 International Conference on Big data, IoT, and Cloud Computing will be held in Jeju, Korea, August 19-21, 2019. The BIC 2019 is the newly renamed conference from highly successful series of the International Conference on Ubiquitous Computing Application and Wireless Sensor Network (UCAWSN) - 4th UCAWSN (July, 2016), 3rd UCAWSN (July, 2015), 2nd UCAWSN (July, 2014), and 1st UCAWSN (July, 2013) since 2013.

The BIC 2019 will be the most comprehensive conference focused on Big data, IoT, and Cloud Computing (BIC). The BIC 2019 will provide an opportunity for academic and industry professionals to discuss the latest issues and progress in the area of BIC such as model, algorithms, applications, services, performance and reliability for Big data, IoT, Cloud Computing. Also, the conference will publish high-quality papers which are closely related to the various theories and practical applications in Big data, IoT, and Cloud computing. Furthermore, we expect that the conference and its publications will be a trigger for further related research and technology improvements in those important subjects. Accepted and presented papers highlight new trends and challenges of Computer Science and its Applications. The presenters showed how new research could lead to novel and innovative applications. We hope you will find these results useful and inspiring for your future research.

We would like to express our sincere thanks to Doo-soon Park (SoonChunHyang University, Korea), James J. (Jong Hyuk) Park (SeoulTech, Korea), and Young-Sik Jeong (Dongguk University, Korea). Our special thanks go to the Program Chairs, all Program Committee members and all the additional reviewers for their valuable efforts in the review process, which helped us to guarantee the highest quality of the selected papers for the conference.

We cordially thank all the authors for their valuable contributions and the other participants of this conference. The conference would not have been possible without their support. Thanks are also due to the many experts who contributed to making the event a success.

BIC 2019  
General Chairs

Han-Chieh Chao, National Ilan University, Taiwan  
Jungho Kang, Baewha Women's University, Korea  
Qun Jin, Waseda University, Japan  
Yi Pan, Georgia State University, USA

## Message from the BIC 2019 Program Chairs

Welcome to the BIC 2019 which will be held in Jeju, Korea on Aug 19~21, 2019. The BIC 2019 provides an opportunity for academic and industry professionals to discuss the latest issues and progress in the area of Computer Science. In addition, the conference contains high quality papers which are closely related to the various theories and practical applications in Computer Science. Furthermore, we expect that the conference and its publications will be a trigger for further related research and technology improvements in this important subject. The BIC 2019 contains high quality research papers submitted by researchers from all over the world. Each submitted paper was peer-reviewed by reviewers who are experts in the subject area of the paper. Based on the review results, the Program Committee accepted papers.

For organizing an International Conference, the support and help of many people is needed. First, we would like to thank all authors for submitting their papers. We also appreciate the support from program committee members and reviewers who carried out the most difficult work of carefully evaluating the submitted papers.

We would like to give my special thanks to Doo-soon Park (SoonChunHyang University, Korea), James J. (Jong Hyuk) Park (SeoulTech, Korea), Young-Sik Jeong (Dongguk University, Korea) as the Steering Committee of BIC for their strong encouragement and guidance to organize the conference. We would like to thank BIC 2019 General Chairs for their advices to make possible organization of The BIC 2019. We would like to express special thanks to execute members for their timely unlimited support.

BIC 2019  
Program Chairs

Arun Kumar Sangaiah, VIT University, India  
Jin Wang, Changsha University of Science & Technology, China

## Organization

### Honorary Chair

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Young-Sik Jeong, Dongguk University, Korea

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Han-Chieh Chao, National Ilan University, Taiwan

Jungho Kang, Baewha Women's University, Korea

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Arun Kumar Sangaiah, VIT University, India

Jin Wang, Changsha University of Science & Technology, China

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## The International Conference on Big data, IoT, and Cloud Computing (BIC 2019)

Hwamin Lee, Soonchunhyang University, Korea  
Jinho Park, Soongsil University, Korea  
Joon-Min Gil, Catholic University of Daegu, Korea  
Jun-Ho Huh, Catholic University of Pusan, Korea  
Kwang-il Hwang, Incheon National University, Korea  
Seokhong Min, Mindata co, Korea  
Wei Song, North China University of Technology, China  
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Byoungwook Kim, Dongguk University, Korea  
Eunyoung Lee, Dongduk Women's University, Korea

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Jung Hanmin, KISTI, Korea  
Burita Ladislav, University of Defence / Tomas Bata University in Zlín, Czech Republic  
Clement Leung, Hong Kong Baptist University, Hong Kong  
RADJEF Mohammed Said, University of Bejaia, Algeria  
Jaesuhp Oh, Sookmyung Woman University, Korea  
Ruben Rios, University of Malaga, Spain

## Keynote Speaker



### Data Modelling and Analysis using the New Discriminative Broad Learning System

**C.L. Philip Chen Ph.D.**

FIEEE, FAAAS, FIAPR, FCAA, FHKIE

Member of Academy of Europe (AE), European Academy of Sciences and Arts (EASA), International Academy for Systems and Cybernetics Sciences;

Editor-in-Chief, IEEE Trans. on Systems, Man, and Cybernetics: Systems

#### Abstract

After a very fast and efficient discriminative Broad Learning System (BLS) that takes advantage of flatted structure and incremental learning has been developed, this talk will address data modeling with outliers and labeling errors. A robust broad learning system (RBLS) is derived by assuming the regression residual and output weights follow their respective distributions, where the output weights for robust modeling can be determined by maximum a posterior estimation. Furthermore, the robustness of RBLS can be enhanced by integrating the regularization theory. In addition, the framework of several BLS variants with their mathematical modellings will be given. The variations include cascade, recurrent, and broad-deep combination that cover existing deep-wide/broad-wide structures. From the experimental results, the BLS/RBLS and its variations outperforms several exist learning algorithms on regression performance over function approximation, time series prediction, face recognition, and data modelling.

#### Biography

C. L. Philip Chen is the Chair Professor and Dean of the College of Computer Science and Engineering, South China University of Technology. Being a Program Evaluator of the Accreditation Board of Engineering and Technology Education (ABET) in the U.S., for computer engineering, electrical engineering, and software engineering programs, he successfully architects the University of Macau's Engineering and Computer Science programs receiving accreditations from Washington/Seoul Accord through Hong Kong Institute of Engineers (HKIE), of which is considered as his utmost contribution in engineering/computer science education for Macau as the former Dean of the Faculty of Science and Technology. He is a Fellow of IEEE, AAAS, IAPR, CAA, and HKIE; a member of Academia Europaea (AE), European Academy of Sciences and Arts (EASA), and International Academy of Systems and Cybernetics Science (IASCYS). He received IEEE Norbert Wiener Award in 2018 for his contribution in systems and cybernetics, and machine learnings. He is also a 2018 highly cited researcher in Computer Science by Clarivate Analytics.

His current research interests include systems, cybernetics, and computational intelligence. Dr. Chen was a recipient of the 2016 Outstanding Electrical and Computer Engineers Award from his alma mater, Purdue University, after he graduated from the University of Michigan at Ann Arbor, Ann Arbor, MI, USA in 1985. He was the IEEE Systems, Man, and Cybernetics Society President from 2012 to 2013, and currently, he is the Editor-in-Chief of the IEEE Transactions on Systems, Man, and Cybernetics: Systems, and an Associate Editor of the IEEE Transactions on Fuzzy Systems, and IEEE Transactions on Cybernetics. He was the Chair of TC 9.1 Economic and Business Systems of International Federation of Automatic Control from 2015 to 2017 and currently is a Vice President of Chinese Association of Automation (CAA).

# PROGRAM SCHEDULE FOR BIC 2019

| Day 1, Aug. 19, 2019 |     |   |
|----------------------|-----|---|
| Time                 | Min | HALL -A   |
| 10:00-12:00          | 120 | Organizing Committee Meeting<br>(Only for Invited Members)              |
| 13:00-15:00          | 120 | Local Arrangement Committee Meeting<br>(Only for Invited Members)       |
| 16:00-17:30          | 90  | Executive Meeting - Organized by BIC 2019<br>(Only for Invited Members) |

| Day 2, Aug. 20, 2019 |     |  |   |
|----------------------|-----|--|---|
| Time                 | Min | HALL A   | HALL B  |
| 08:40-09:00          | 20  | Registration   |   |
| 09:00-10:30          | 90  | <b>Session A-1</b><br><b>BIC2019</b><br>Chair : JiSu Park  | <b>Session B-1</b><br><b>BIC2019/FTS 2019</b><br>Chair : Chaeho Cho |
| 10:30-10:40          | 10  | Coffee Break   |   |
| 10:40-12:10          | 90  | <b>Session A-2</b><br><b>BIC2019</b><br>Chair : Byoungwook Kim   | <b>Session B-2</b><br><b>BIC2018</b><br>Chair : Jaehwa Chung        |
| 12:10-13:40          | 90  | Lunch  |   |
| 13:40-14:20          | 40  | <b>Data Modelling and Analysis using the New Discriminative Broad Learning System</b><br><b>C. L. Philip Chen</b><br>(HALL AMETHYST; 2F of main building)<br>Chair: Kwang-il Hwang |   |
| 14:20-14:30          | 10  | Coffee Break   |   |
| 14:30-16:00          | 90  | <b>Session A-3</b><br><b>BIC2019</b><br>Chair : Deok-Gyu Lee   | <b>Session B-3</b><br><b>BIC2019</b><br>Chair : Yan Li              |
| 16:00-16:10          | 10  | Coffee Break   |   |



**The International Conference on Big data, IoT, and Cloud Computing (BIC 2019)**

|             |    |  |  |
|-------------|----|--|--|
| 16:10-17:40 | 90 | <b>Session A-4<br/>BIC2019</b><br>Chair : Chayoung Kim                         | <b>Session B-4<br/>BIC2019</b><br>Chair : Joon-Min Gil |
| 18:00-      |    | <b>Banquet</b><br>(HALL CRYSTAL; 2F of main building)<br>Chair: Kwang-il Hwang |  |

| <b>Day 3, Aug. 21, 2019</b> |     |   |
|-----------------------------|-----|---|
| Time                        | Min | HALL A  |
| 09:00-10:30                 | 90  | <b>Session A-5<br/>HCIS Workshop 2019</b><br>Chair : Yan Li |
| 10:30-10:40                 | 10  | <b>Coffee Break</b>   |
| 10:40-12:40                 | 120 | <b>Session A-6<br/>BIC2019</b><br>Chair : Byoungwook Kim    |

1. A paper presentation should be made by one of authors of the paper for 15 minute. (10 minutes for the presentation itself and 5 minutes for Q/A)
2. All speakers of each session should meet the session chair at their room 10 minutes before the session begins.
3. Windows 7 laptops running the Adobe Reader and Microsoft Office for paper presentations will be prepared. Please prepare for your presentation.

## DETAILED SCHEDULE FOR BIC 2019

### Day 1, Aug. 19, 2019 (Monday)

- 10:00-12:00 Organizing Committee Meeting
- 13:00-15:00 Local Arrangement Committee Meeting
- 16:00-17:00 Executive Meeting – Organized by BIC 2019

### Day 2, Aug. 20, 2019 (Tuesday)

08:40-09:00 Registration

09:00-10:30 Session A-1 : BIC 2019  
(HALL A)  
(Chair: JiSu Park)

- 1. 3D Re Identification of essential proteins based on Multi-source information on uncertain protein-protein interaction networks**  
*Wei Liu, Liangyu Ma, Yuliang Tang, Ling Chen, Bolun Chen*
- 2. A Novel Algorithm for identifying essential protein based on protein complex on dynamic PPI network**  
*Wei Liu, Liangyu Ma, Yuliang Tang*
- 3. Optimal Coverage Trajectory Scheduling Supported for Mobile Sink in Wireless Sensor Network**  
*Yu Gao, Jin Wang, Wenbing Wu, Chang Zhou, Zhenghong Gu*
- 4. Fault Tolerant Technique using Context-Aware Information in Mobile IoT Environment**  
*JiSu Park, Byoungwook Kim, HongJun Jang, Yeongwook Yang, UkJae Ryu, Jin Gon Shon*
- 5. An Influence Blocking Maximization Algorithm Based on Community Detecting in Social Networks**  
*Wei Liu, Jie He, Ling Chen, Bolun Chen*
- 6. An exploration with multiple  $\epsilon$ -buffers in reinforcement learning**  
*Chayoung Kim, JiSu Park*

**09:00-10:30 Session B-1 : BIC2019/FTS 2019**

**(HALL B)**

**(Chair: Chaeho Cho)**

- 1. A survey on the hierarchy of big data service architecture**  
*Jin Wang, Yaqiong Yang, Siqi Zhong, Lei Wang, Jingyu Zhang*
- 2. A Study on Short-term Wind Power Prediction Model using Long Short-term Memory**  
*Namrye Son, Eunju Kang, Jeongseung Na and Seunghak Yang*
- 3. Measuring the Importance of Log using Temporal Correlation**  
*Byungchul Tak, Seorin Park*
- 4. Inter-Application Vulnerability Diagnostic Mechanism for Android Applications Using a Vulnerable Matrix**  
*Cheolmin Yeom, Seonghwan Cho, and Yoojae Won*
- 5. Detection of Evil Twin access point using machine learning**  
*Jeonghoon Seo, Chaeho Cho, Yoojae Won*
- 6. Malware Detection with Combination of Static and Dynamic Features and Machine Learning**  
*JinSu Kang and Yoojae Won*

**10:30-10:40 Coffee Break**

**10:40-12:10 Session A-2 : BIC 2019**

**(HALL A)**

**(Chair: Byoungwook Kim)**

- 1. An Integrated Development Environment for Anti-tampering of Internet of Things Devices**  
*Ara Hur and Yeonseung Ryu*
- 2. The Framework for Discovery of Risk Estimation Patterns in Clinical Data**  
*Kwang Sun Ruy, Sang Won Lee, Jae Dong Lee, Jip Min Jung, Hyo Soung Cha*
- 3. A Reliable Data Collection Architecture for Cyber Threat Intelligence**  
*Jeonghun Cha, Jong Hyuk Park, Young-Sik Jeong*
- 4. Deep Learning-based Cloud Enabled-Architecture for Smart Healthcare**  
*Sushil Kumar Singh and Jong Hyuk Park*
- 5. Block Chain Based Enhanced Data Reliability Maintenance Architecture for C-ITS**  
*Younghun Lee, Jeong Hoon Jo, Sang Kee Suk and Jong Hyuk Park*
- 6. An Improved Style Transfer Method by Convolution Neural Network**  
*Chang Zhou, Zhenghong Gu, Jin Wang*

**10:40-12:10 Session B-2 : BIC 2019**

**(HALL B)**

**(Chair: Jaehwa Chung)**

- 1. Development Status and Future Prospects of Blockchain Technology**

2. *Jiwon Han, Yerin Yu, Hanmi Lee, Hyun-Woo Kim, Sunghyun Jee, Jung-Ho Kang*
3. **ECG-based Biometric Using Independent Component Analysis Network**  
*Jae-Neung Lee, Keun-Chang Kwak*
4. **Processing Sensitive Data based on Secure Execution Environment in the Cloud**  
*SooCheol Oh, SeongWoon Kim*
5. **Implementation of 3D Viewer System for Mobile Device using Extended Set of Data of NG eCall**  
*Joon-Gyu Kang, Yoo-Won Kim, Sung-Sub Kim, Moon-Seog Jun*
6. **A Study on Software-based Secure Storage System for Service Updates in Telematics Environment**  
*Mingyu Kim, Euijoong Kim, Byoungsoo Koh*
7. **Prediction of Ozone Concentration Based on ARIMA Model**  
*JinSoo Park, Kyeong-Rae Choo, You-Boo Jeon and Doo-Soon Park*

**12:10-13:40 Lunch**

**13:40-14:20 Invited Speaker**  
**(HALL AMETHYST; 2F of main building)**  
**(Chair: Kwang-il Hwang)**

**Data Modelling and Analysis using the New Discriminative Broad Learning System**

**C. L. Philip Chen**

FIEEE, FAAAS, FIAPR, FCAA, FHKIE

Member of Academy of Europe (AE), European Academy of Sciences and Arts (EASA),

International Academy for Systems and Cybernetics Sciences; Editor-in-Chief, IEEE Trans. on Systems, Man, and Cybernetics: Systems

**14:20-14:30 Coffee Break**

**14:30-16:00 Session A-3 : BIC 2019**  
**(HALL A)**  
**(Chair: Deok-Gyu Lee)**

1. **Comparative Analysis of Person Classification using Pretrained CNNs based on ECG Frequency-Time Representation**  
*Yeong-Hyeon Byeon, Keun-Chang Kwak*
2. **A Study on the Sentimental Analysis through the Pre-processing of Sentimental First-Phoneme Korean words**  
*Junseo Park, Jaehwa Chung*
3. **A Comparative Analysis on the Performance Evaluation Method of Granular Model**

*Chan-Uk Yeom, Keun-Chang Kwak*

- 4. Openholo : Search-based Source Code Analysis and Mass Data Storage Functions**  
*Lee Unhak, Go Byeongsu*
- 5. TPS Analysis, Performance Indicator of Public Blockchain Scalability**  
*Hyug-Jun Ko, Seong-Soo Han, You-Boo Jeon, Chang-Sung Jung*
- 6. Crypto-IoT: Deep learning-based defense against Crypto-jacking attacks in IoT devices**  
*Mikail Mohammed Salim and Jong Hyuk Park*

**14:30-16:00 Session B-3 : BIC 2019**

**(HALL B)**

**(Chair: Yan Li)**

- 1. Development of Augmented Reality Affordance System for Motor Performance: In the Sports Climbing**  
*Myeong Hyeon Heo, Dongho Kim*
- 2. An approach for improving augmented reality quality using 3D CAD model**  
*Thanh Tran Van, Dongho Kim*
- 3. Host-based malware variants detection method using logs**  
*Woo-Jin Joe Hyong-Shik Kim*
- 4. A Study on CPS to Protect Context Information and Privacy of User for Reliable P2P Environment**  
*Aria Seo, Junho Jeong*
- 5. Acceleration of Predictive Elastic Weight Consolidation Using Node Pruning**  
*Dae Yong Hong, Yan Li, Byeong-Seok Shin*
- 6. Design of Digital Forensic Management Model Based on Hyperledger Fabric**  
*Junho Jeong, Donghyo Kim, Yunsik Son*

**16:00-16:10 Coffee Break**

**16:10-17:40 Session A-4 : BIC 2019**

**(HALL A)**

**(Chair: Chayoung Kim)**

- 1. Haptic Rendering of Object's Roughness using Inverse Perlin Noise** Sang-Youn Kim, Seong-Man Cho, Dong-Soo Choi, Byeong-Seok Shin
- 2. Landing position Detection using audio recognition and Kalman filtering in a sports environment**  
*Man-Ki Kim, Gye-Young Kim, Jin-Ho Park*
- 3. Quantity Measurement of Same Shaped Construction Materials Using Drone**  
*Ji-Hwan Moon, Gye-Young Kim, Jin-Ho Park*
- 4. Fake Image Discrimination of Iris Images by DCT-based Watermark Insertion**  
*Jae-gab Choi, Gye-young Kim, Jin-ho Park*

5. **Parallel Weighed Graph Clustering based on Minhash**  
*Jueun Jeon, Byoungwook Kim, Young-Sik Jeong*
6. **Design of an Augmented Reality based Application for Evaluation and Training of Postural Stability**  
*Eun-Young Lee, Dongho Kim*

**16:10-17:40 Session B-4 : BIC 2019**  
**(HALL B)**  
**(Chair: Joon-Min Gil)**

1. **Network Graph using the FCA method from User's Personalized Characteristic**  
*Phonexay Vilakone, Khamphaphone Xinchang, Wan-Su Joo, Doo-Soon Park*
2. **Adaptive Object Detector for Real-time Multi-channel Video Stream**  
*Kwang-il Hwang, Junghoon Lee, and Young-Bin Jeong*
3. **Video Object Detection Algorithm Based on Dynamic Combination of Sparse Feature Propagation and Dense Feature Aggregation**  
*Danyang Cao, Jinfeng Ma, Zhixin Chen*
4. **Design of the Eccentric Viewing Training Contents for the Rehabilitation of the Peripheral Visual Function**  
*DoKyeong Lee, HwaMin Lee*
5. **A Planar Detection System Based on 3D Hough Transform for LiDAR Point Clouds**  
*Yifei Tian, Wei Song, Jeonghoon Kwak, Simon Fong*
6. **A Framework of Human-Land Sustainable Computational System Based on Geo-Social Networks**  
*Fei Hao, Beibei Pang, Yixuan Yang, Doo-Soon Park*

**18:00-19:30 Banquet**  
**(HALL CRYSTAL; 2F of main building)**  
**(Chair: Kwang-il Hwang)**

**Day 3, Aug. 21, 2019 (Wednesday)**

**09:00-10:30 Session A-5 : HCIS Workshop 2019**  
**(HALL A)**  
**(Chair: Yan Li)**

1. **CNN-based 3D Object Classification from Hough Space of LiDAR Point Clouds**  
*Wei Song, LingFeng Zhang, Yifei Tian, Zishu Liu, Simon Fong*
2. **Object Detection Based on Multi-Scaled Deformable Convolutional Neural Networks**  
*Danyang Cao, Zhixin Chen, Lei Gao*
3. **Pedestrian classification based on segment and track classification using four-layer laser scanner**  
*Mingfang Zhang, Rui Fu, Yingshi Guo, Li Wang, Pangwei Wang, Hui Deng*

**4. Scenario Generation Method for Various Driving Circumstances on Roads in Virtual Environments**

*Mingyun Wen, Jisun Park, Kyungeun Cho*

**5. An Approach to Bug Report Triage by combining topic sets**

*Dong-Gun Lee, Yeong-Seok Seo*

**6. Generalization of intensity distribution of medical images using GANs**

*Dongho Lee, Yan Li, Byeongseok Shin*

**10:30-10:40 Coffee Break**

**10:40-12:40 Session A-6 : BIC 2019**

**(HALL A)**

**(Chair: Byoungwook Kim)**

**1. A Method of Finger Counting by Fingertips Recognition**

*Duhoe Kim, Doyeob Lee, Dongil Shin and Dongkyoo Shin*

**2. Development of Real-time Human Depression Diagnosis System by Analyzing Brainwaves**

*Duhoe Kim, Dongil Shin and Dongkyoo Shin*

**3. Unauthorized AP Detection System Based on Machine Learning**

*Duhoe Kim, Doyeon Kim, Jaejoon Hwang, Dongil Shin and Dongkyoo Shin*

**4. Modeling/Design of Big Data Analysis Android Application for Korean Medical Tourism: Machine Learning Approach**

*Jun-Ho Huh, Yeong-Seok Seo*

**5. Graph Centrality-based Keyword Extraction for CQI Documents**

*They Pheaktra, JongHyuk Lee, Joon-Min Gil*

**6. A Study on Malicious Code Detection Using Block Chain and Deep Learning**

*Yong cheol Choi, Deok Gyu Lee*

**7. A Preventive CCTV Monitoring System for Solitary Deaths of Senior Citizens**

*Jun-Ho Huh, Kyungryeong Seo, Yeong-Seok Seo*

**8. A Marine Products Auction Solution Suitable for Cooperative Fish Market**

*Jun-Ho Huh, Ki-Youn Kim, Yeong-Seok Seo*

## Conference Venue



### MAISON GLAD JEJU

- MAISON GLAD JEJU Hotel
  - 80, Noyeon-ro, Jeju-si, Jeju-do, Korea
  - Front desk TEL +82-64-747-5000 / FAX +82-64-742-3150
  - Reservation TEL +82-64-747-5000 / FAX +82642-742-3150
- Web: <https://maisongladjeju-hotels.com/en/web/maison-en>

