2022 5th International Conference on **Power Electronics and Control Engineering**

Organizers:

Changchun University of Science and Technology **Chongqing University** East China Jiaotong University **(D) = (CE 2022** Guangxi University

August 19-21, 2022 **O** Virtual Conference



Publication Chair

Prof. Guangfeng Shi

Changchun University of Science and Technology, Chin

Technical Program Committee Chair



Changchun University of Science and Technology, China



Guangdong High Performance Computing Society, China



Prof. XiaoDong Li School of Intelligent Systems Engineering, SUN YAT-SEN University, China

Technical Program Committee

Prof. Yongdong Li, Tsinghua University, Cina Prof. YuNong Zhang, SUN YAT-SEN University, China Prof. Hui Cheng, SUN YAT-SEN University, China Prof. YuHui Deng, Jinan University, China Prof. SenPing Tian, South China University of Technology, China Prof. Chao Bi, Technical Director of Shaofeng Technology, China Prof. ZhengYou He, Southwest Jiaotong University, China Prof. JinSong Kang, Tongji University, China Prof. Hongzhong Ma, Hohai University, China Prof. Ronghai Qu, Huazhong University of Science and Technology, China Prof. Tianhao Tang, Shanghai Maritime University Prof. Fushuan Wen, Zhejiang University, China Prof. Zhenglin Yu, Changchun University of Science and Technology, China Prof. Yuanjun Hou, CRRC Yongji Electric Co., Ltd., China Prof. XinZhang Wu, Guangxi University, China Prof. Dehong Xu, Zhejiang University, China Prof. Liye Xiao, Institute of Electrical Engineering Chinese Academy of Sciences, China Prof. Guoqing Xu, Shanghai University, China Prof. Kaigui Xie, Chongqing University, China Prof. Guilin Yang, Instituted of Advanced Manufacturing Technology, CNITECH, China Prof. Xiaoming Cha, Wuhan University, China Prof. Xing Zhang, Hefei University of Technology, China Prof. Osama Mohammed, Florida International University, USA Prof. Kamal Kumar Sharma, Lovely Professional University, Indian Prof. Jizhong Zhu, South China University of Technology, China Assoc. Prof. GHAMGEEN IZAT RASHED, Wuhan University, School of Electrical Engineering and

Automation. China

Assoc. Prof. Sergio Vázquez, University of Seville, Spain

Assoc. Prof. Pinial Khan, Sindh Agriculture University Tando Jam Pakistan

Assoc. Prof. Anwar Ali, Zhejiang Sci-Tech University, China

Assoc. Prof. Antti Rasila, Guangdong Technion - Israel Institute of Technology, China

Assoc. Prof. Pinial Khan, Sindh Agriculture University Tando Jam Pakistan

Organizing Committee Chairs



Prof. Guohua Cao Changehun University of Science and Technology, China



Prof. GohHui Hwang Guangxi University, China



East China Jiaotong University, China



Prof. Yuanchang Zhong Chongqing University, China

Organizing Committee members

Prof. Fengde Liu, Changchun University of Science and Technology, China

Prof. Zhijun Zhang, IEEE Senior Member, Chairman of IEEE CIS (Computational Intelligence) Guangzhou Chapter, Professor of South China University of Technology, PhD Supervisor, National Talent

Prof. Min Chen, Zhejiang University, China

Prof. Xiong Du, Chongqing University, School of Electrical Engineering, Chongqing University (Deputy Dean), China

Prof. Cungang Hu, Anhui University, China

Prof. Wei Hua, Southeast University, China

Prof. Quan Jiang, University of Shanghai for Science and Technology, China

Prof. Xuguang Min, Jiangxi Science and Technology Normal University, China

Prof. Wei Xu, Huazhong University of Science and Technology, China

Prof. Yongxiang Xu, Harbin Institute of Technology, China

Prof. Jinbin Zhao, Shanghai University of Electric Power, China

Prof. Shiming Chen, East China Jiaotong University, China

Prof. Xiping Liu, Jiangxi University of Science and Technology, China

Prof. Linsen Song, Changchun University of Science and Technology, China

Prof. Shuang Zhang, Changchun Institute of Technology, China

Prof. Sivakumar P, Karpagam College of Engineering, USA

Prof. Jerry Chun-Wei Lin, Western Norway University of Applied Sciences, Norway

Prof. Suresh Kaswan, School of Computing | IQAC at RIMT University, India

Prof. Intan Zaurah Mat Darus, Universiti Teknologi Malaysia, Malaysia

Assoc. Prof. Shuangxia Niu, Hong Kong Polytechnic University, China

Assoc. Prof. Yong hao, East China Jiaotong University, China

Assoc. Prof. Qiping Chen, East China Jiaotong University, China

Assoc. Prof. Bin Gou, Southwest Jiaotong University, China

Assoc. Prof. Jian Gao, Hunan University, China

Assoc Prof. Ruchi Doshi, University Azteca, Mexican

Assistant Prof. Khalid Al-Hussaini, Thamar University, Yemen

Chairman Wishes



In the context of social and economic progress and development, science and technology and computer technology have also been developed accordingly.

In such a situation, the theory of power electronics and control engineering has also been enriched and entered a new era. It has also become a very important technical tool in many fields such as artificial intelligence. Meanwhile, we warmly welcome scholars from all walks of life to attend this academic conference, actively share the latest research results and promote academic exchanges. We wish this conference a great success. The 2022 5th International Conference on Power Electronics and Control Engineering (ICPECE 2022) will be held on August 19-21 2022, which is a virtual conference. ICPECE 2022 is to bring together innovative academics and industrial experts in the field of "Power Electronics" and "Control Engineering" to a common forum. The primary goal of the conference is to promote research and developmental activities in "Power Electronics and Control Engineering" and another goal is to promote scientific information interchange between researchers, developers, engineers, students, and practitioners working all around the world.

The conference will be held every year to make it an ideal platform for people to share views and experiences in "Power Electronics" and "Control Engineering" and related areas.

Important Dates

Full Paper Submission Date: August 17, 2022 Registration Deadline: August 14, 2022 Final Paper Submission Date: August 18, 2022 Conference Date: August 19-21, 2022 Supported By



Dalian Jiaotong University, China

School of Mechanical and Electrical Engineering, Changchun University of Science and Technology, China National and Local Joint Engineering Laboratory for Precision Manufacturing and Testing Technology, China Key Laboratory of Cross-scale Micro-Nano Manufacturing Technology of Ministry of Education, China National Optical International Cooperation Base, China

School of Computer Science and Technology, Changchun University of Science and Technology, China School of Electronic Information Engineering, Changchun University of Science and Technology, China College of Optoelectronic Engineering, Changchun University of Science and Technology, China College of Mechanical and Electrical Engineering, Changchun Institute of Technology, China Key Laboratory of Conveyance and Equipment of Ministry of Education, East China Jiaotong University, China Institute of Precision Machining and Intelligent Equipment Manufacturing, East China Jiaotong University, China

Keynote Speakers

Q	Prof. Chengzhi Su Changotan University of Science and Technology, China
	Prof. Yinsquan Yu East China Justicing University, China
0	Prof. Ruqiang Yan Nëmi Santung University, China
!	Yupeng Zhang, Seutor Engineer YAW Ormp New Energy Development Institute. China
	Prof. Yuanchang Zhong Chongquig University, China
R	Prof. Hunjun Doug Dalan Jantang University. China
2	Prof. Shanyong Zhang Souloopst University, China
	Prof Eric Cheng The Hong Kong Polysodnic University, Calm
	Prof. Hauxi Cong Itnes Kay Laboratory of New Baargy Power Systems, North China Blazen: Power University, China
	Prof. Hassaan Hares Alfhedou Monosh University, Aaaterdaa
Q	Prof. Viming Zhang Futhar Usiverity, Chine
	Prof. Yajun Liu



Prof. S. H. Gary Chan

Hong Kong University of Science and Technology, China



Assoc, Prof. Chuanjun Zhao

Stanui University of Finance and Economics, China



Prof. Sailesh Iyer Itai Uavanity, Inda

Table of contents Volume 2394 2022 Previous issue Next issue > 1st Lekantara Annual Conference on Engineering and Information Technology (LITE) 01/10/2021 -01/10/2021 Online Accepted papers received: 22 November 2022 Published online: 26 December 2022 Open all abstracts Preface **OPEN ACCESS** 011001 Preface Lekantara Annual Conference on Engineering and Information Technology (LITE) + Open abstract View article 5 PDF **OPEN ACCESS** 011002 This site uses cookies. By continuing to use this site you agree to our use of cookies. To find out more, see our Privacy and Cookies policy. Algorithm and Modeling **OPEN ACCESS** 012001 Vise Kriterijumska Optimizacija I Kompromisno Resenje (VIKOR) Algorithm for Analysis as Supporting System K Prihartono Aksan Halim, Hendra Jatnika, Agus Alim Muin, Dian Agustini, Muthia Farida, Nur Hidayati, Ari Waluyo and Rulinawaty + Open abstract View article PDF **OPEN ACCESS** 012002 Neural Network Back-Propagation Method as Forecasting Technique Teguh Iman Hermanto, Ali Idrus, Lipur Sugiyanta, Darmeli Nasution and Ikhsan Gunawan + Open abstract T View article PDF PDF **OPEN ACCESS** 012003 ARAS Algorithm as Decision Support System's Technique for Selection Student Creativity Program Aries Abbas, Debi Masri, Pungkas Prayitno, H Hasanuddin, Z Zaenuddin, Fitrah Yuridka, Mokhamad Ramdhani Raharjo and Yohny Anwar + Open abstract View article PDF OPEN ACCESS 012004 Restricted Boltzmann Machine and Matrix Factorization-Alternating Square Algorithm for Development Tourist **Recommendation System** Yohanssen Pratama, Riyanthi Angrainy Sianturi, Dedi Chandra, Kristopel Lumbantoruan and Indah Trivena Tampubolon + Open abstract F View article PDF **OPEN ACCESS** 012005 This site uses cookies. By continuing to use this site you agree to our use of cookies. To find out more, see our Privacy and Cookies policy.

OPEN ACCESS		ing Alexandre for France Ffficient Providentian Flow Films Colordality Problem	012006
A Novel Hybrid I	viulti-verse Optim	a Decade Seture Without Dise Seture Windows and Med Stees Belerwards	
Dana Marsetiya Ota	ima, M. raisai Ibrahin	n, Danang Sedya Wijaya, Dian Sedya Widodo and Mien Dines Primayesti	
 Open abstract 	[E] View article	≥ PD+	
OPEN ACCESS			012007
Backpropagation	n Artificial Neural	Network Enhancement using Beale-Powell Approach Technique	
Roy Nuary Singarim	nbun, Ondra Eka Putr	a, N L W S R Ginantra and Mariana Puspa Dewi	
+ Open abstract	TView article	2 PDF	
OPEN ACCESS			012008
Comparison Flet	cher-Reeves and P	Polak-Ribiere ANN Algorithm for Forecasting Analysis	
Eka Hayaria Hasibu	an, Surya Hendraputi	a, GS Achmad Daengs and Liharman Saragih	
+ Open abstract	T View article	2 PDF	
OPEN ACCESS			012005
Implementation	and Development	t of Learning Vector Quantization Supervised Neural Network	
Retno Devita, Ruri H	Hartika Zain, Hadi Sya	hputra, Evan Afri and Intan Maulina	
+ Open abstract	View article	2 PDF	
OPEN ACCESS			012010
Artificial Neural	Network Model fo	or Forecasting Natural Disasters: Polak-Ribiere and Powell-Beale Comparison	
Eva Rianti, Firna Yer	nila, A.A.G.B.Ariana, Y	esri Elva and Novi Trisna	
+ Open abstract	Tiew article	PDF	
OPEN ACCESS			012011
Rough Set: Utiliz	ring Machine Lear	ning for the Covid-19 Vaccine	012011
Silfia Andini, Nur A	rminarahmah. GS Ach	mad Daenos. Sara Surva and Muhammad Afdhal	
+ Open abstract	View article	PDF	
OPEN ACCESS			012012
Analysis Instrum	ents Using Decisio	on System Concepts	
Syariful Alam, Daya	n Singasatia, Hendri S	Sembiring, Murwani Wulansari, Dedi Suhendro and Ilham Syahputra Saragih	
+ Open abstract	View article	2 PDF	
OPEN ACCESS			012013
Dynamics System	n for Construction	Modelling	
Diah Sarasanty and	Erna Tri Asmorowati		
+ Open abstract	I View article	2 PDF	
OPEN ACCESS			012014
Feature Extractio	on and Naïve Baye	s Algorithm for Defect Classification of Manalagi Apples	
Moch, Lutfi, Hasan	Syaiful Rizal, Mochan	nmad Hasyim, Muhammad Faishol Amrulloh and Zulfatun Nikmatus Saadah	

+ Open abstract 🛛 🔄 View article 🛛 😤 PDF

Algorithms and Complexity

OPEN ACCESS	012015
Python Based Machine Learning Text Classification	
Siti Mujilahwati, Miftahus Sholihin, Retno Wardhani and M. Rosidi Zamroni	
+ Open abstract 💮 View article 🟂 PDF	
Artificial Intelligence, Computer Networks and Communicat	ions
OPEN ACCESS	012016
Implementation Learning Vector Quantization Using Neural Network for Cl	lassification of Ear, Nose and Throat Disease
Samsir Samsir, Nelly Khairani Daulay, Syaiful Zuhri Harahap, Wahyuni Fithratul Zalmi, Afr	ni Nia Sari, Fitri Aini Nasution and Ronal Watrianthos
+ Open abstract 📰 View article 😕 PDF	
Computer Vision and Image Analysis	
OPEN ACCESS	012017
Image Segmentation using Color Value of the Hue in CT Scan Result	
Sedia Simbolon, Juju Jumadi, K Khairil, Y Yupianti, Liza Yulianti, S Supiyandi, Agus Perdar	na Windarto and Sri Wahyuni
+ Open abstract TView article PDF	
OPEN ACCESS	012018
Convolutional Neural Network for object Identification and Detection	
Silfia Andini, Erni Rouza, Luth Fimawahib, Satria Riki Mustafa, Ahmad Fathoni, Teguh Ima	in Hermanto and Anggi Pratama Nasution
+ Open abstract 📳 View article 😰 PDF	
OPEN ACCESS	012019
Convolutional Neural Network and Deep Learning Approach for Image De	etection and Identification
Eka Pandu Cynthia, Edi Ismanto, M. Imam Arifandy, S Sarbaini, N Nazaruddin, Melda Ag	nes Manuhutu, Muhammad Ali Akbar and Abdiyanto
+ Open abstract 📰 View article 🔁 PDF	
OPEN ACCESS	012020
Brain Image Decomposition on Image Alteration	
Sri Rahmawati, GS Achmad Daengs, Teri Ade Putra, Abdi Rahim Damanik and Anjar Wa	nto
+ Open abstract 👘 View article 🔁 PDF	
Control Engineering and Electric Automation	
OPEN ACCESS	01202
Increasing the Compressive Strength of Concrete Using PPC	
Arusmalem Ginting	
+ Open abstract 📰 View article 📂 PDF	
OPEN ACCESS	01202
Design of Direct Current Motor Speed Controlled Anchor Based on Root L	ocus Method

Rismawaty Arunglabi, Nicolaus Allu and Merlin

+ Open abstract 📰 View article 🥦 PDF

OPEN ACCESS			012023
Analysis of Perfe	ormance on Pump	Test Equipment Series and Parallel	
Salma Salu, Jusuf S	iahaya, Kriatiana Pasa	u, Karel Tikupadang and Danang Haryo Yudanto	
+ Open abstract	View article	2 PDF	
OPEN ACCESS			012024
A Design And B	uild A Robot Vacuu	im Cleaner	
Chamia Iradat Rap	a, Erick Dephtios, Chri	sna Mariangga and Naomi Patiung	
+ Open abstract	View article	2 PDF	
OPEN ACCESS			012025
Utilization of Ar	duino on Electric N	Aotor Starting	
Matius Sau, Yoel Je	amri and Yusril Azarya	a Monasri	
+ Open abstract	View article	死 PDF	
OPEN ACCESS			012026
Design of wind	power plant with a	turbine capacity of 300 Watt	
Hestikah Eirene Pa	toding, Yolgi Jaya Octi	af, Ezriel Dukku, Yulianus Songli and Musa B. Palungan	
+ Open abstract	T View article	2 PDF	
Control Syste	em		
OPEN ACCESS			012027
Android Remote	Control System u	sing wireless connection	
Ahmad Sujana, Nin	ik Sri Lestari, Rosmalir	a, Hendi Suhendi and Mohamad Abduh	
+ Open abstract	I View article	2 PDF	
OPEN ACCESS Realtime Monito Eodia T. Sedan Lob	o <mark>ring Design of Sol</mark> o, Poisson Rownaldy	ar Cell Power Plant Based on IoT Takaya and Ivanto Bin Paledung	012028
 Open abstract 	View article	25 PDF	
OPEN ACCESS	12 - 1910 - 1924		012029
Development of	Four Nossel Cross	Flow Turbine	
Corvis L Rantererur Open abstract	ig, Titus Tandiseno an	d Mika Mallisa	
Data Analysis	s, Computation	al Methods and Algorithms Optimization	
OPEN ACCESS			012030
Analytical Hierar	chy Process Algori	thm for Define of Water Meter	
Agung Widarman, 1	Indra Riyana Rahadjer	ng, Isnurrini Hidayat Susilowati, Siti Sahara and Muhammad Toyib Daulay	
+ Open abstract	E View article	PDF	
- open and a			
OPEN ACCESS			01203
Data Mining K-	Means Algorithm	for Performance Analysis	
Agung Triayudi, Ik	sal and Reni Haerani		
+ Open abstract	TView article	PDF	
OPEN ACCESS			012032
Data Centre Ris	k Analysis Using I	SO 31000:2009 Framework	
Johanes Fernande	s Andry, Lydia Liliana	Hendy Tannady and Abdul Samad Arief	

+ Open abstract 👘 View article PDF

Education

Online Student-v	Provide and the second s		
onnie Student v	vorksheet Based o	on Toulmin Argumentation Pattern in Physics Learning	
D Sulisworo and Inr	ri Safitri		
+ Open abstract	Tiew article	2 PDF	
Intelligent Co	mputation an	d Engineering Applications	
OPEN ACCESS			01203
Android-Based A	Application for Use	er Complaint as to Support SLA Implementation	
Fatsyahrina Fitriastu	ıti, Ryan Ari Setyawar	1, Yogi Ari Sudewo and Jeffry Andhika Putra	
 Open abstract 	View article	2 PDF	
OPEN ACCESS			01203
Internet of Thing	s Implementation	for Development of Smart Agriculture Applications	
Ninik Sri Lestari, An	drew Ghea Mahardik	a, Sukimo, Herawati and Hermawaty	
+ Open abstract	🗐 View article	2 PDF	
OPEN ACCESS			01203
Convolutional N	eural Network Ap	proach and Implementation Sensor Design for Detecting Object	
Suberman Studer	Trasva M Ari Ibean A	D All Manufach and Manuana Al Allald	
anite many a cracely	trasket the tax trasport of	K Ali Mahasan ang Marwan Al-Akalgi	
+ Open abstract Material and	View article	s Analysis	
+ Open abstract Material and OPEN ACCESS	View article	s Analysis	01203
+ Open abstract Material and OPEN ACCESS Hot Water Extra	View article Characteristics	s Analysis	01203
Open abstract Material and OPEN ACCESS Hot Water Extra Muhammad Saleh.	View article Characteristics ction on Aspal But Setyawati Yani and N	s Analysis	01203
Open abstract Material and OPEN ACCESS Hot Water Extra Muhammad Saleh, + Open abstract	View article Characteristics ction on Aspal But Setyawati Yani and N	s Analysis ton turjannah PDF	01203
Open abstract Material and OPEN ACCESS Hot Water Extra Muhammad Saleh, + Open abstract OPEN ACCESS	View article Characteristics ction on Aspal But Setyawati Yani and N	s Analysis ton turjannah PDF	01203
Open abstract Material and OPEN ACCESS Hot Water Extra Muhammad Saleh, + Open abstract OPEN ACCESS Analysis Waste I	View article Characteristic: ction on Aspal But Setyawati Yani and N Twiew article Material of Constru	S Analysis ton turjannah D PDF uction on Concrete Column	01203
Open abstract Material and OPEN ACCESS Hot Water Extra Muhammad Saleh, + Open abstract OPEN ACCESS Analysis Waste I Helen Adry Irene S	View article Characteristics ction on Aspal Bul Setyawati Yani and N C View article Material of Constru opacua and Luciana B	s Analysis ton turjannah DE PDF uction on Concrete Column Buarlele	01203
Open abstract Material and OPEN ACCESS Hot Water Extra Muhammad Saleh, + Open abstract OPEN ACCESS Analysis Waste F Helen Adry Irene Si + Open abstract	View article Characteristic: ction on Aspal But Setyawati Yani and N I View article Material of Constru opacua and Luciana B I View article View article	S Analysis ton turjannah pDF uction on Concrete Column Buarlele PDF	01203
Open abstract Material and OPEN ACCESS Hot Water Extra Muhammad Saleh, + Open abstract OPEN ACCESS Analysis Waste I Helen Adry Irene Si + Open abstract OPEN ACCESS	View article Characteristic: ction on Aspal But Setyawati Yani and N Total View article Material of Constru opacua and Luciana f Total View article View article	PDF s Analysis ton turjannah DF uction on Concrete Column Buarlele PDF	01203 01203 01203
Open abstract Material and OPEN ACCESS Hot Water Extra Muhammad Saleh, + Open abstract OPEN ACCESS Analysis Waste I Helen Adry Irene Si + Open abstract OPEN ACCESS Analysis of Tensi	View article Characteristic: Ction on Aspal But Setyawati Yani and N I View article Material of Constru opacua and Luciana B I View article View article de Tests and Micro	S Analysis ton turjannah D PDF uction on Concrete Column Buarlele PDF astructures of ST. 37 Steel Undergoing Carburizing Process Using Coal Powder	01203
Open abstract Material and OPEN ACCESS Hot Water Extra Muhammad Saleh, + Open abstract OPEN ACCESS Analysis Waste I Helen Adry Irene Si + Open abstract OPEN ACCESS Analysis of Tensi Atus Buku, Salma S	View article Characteristics ction on Aspal But Setyawati Yani and N I View article Material of Constru opacua and Luciana B I View article ide Tests and Micro salu, Merliana Pangad	PDF s Analysis ton lurjannah	01203
Open abstract Material and OPEN ACCESS Hot Water Extra Muhammad Saleh, + Open abstract OPEN ACCESS Analysis Waste I Helen Adry Irene S + Open abstract OPEN ACCESS Analysis of Tensi Atus Buku, Salma S + Open abstract	View article Characteristic: Ction on Aspal But Setyawati Yani and N C View article Material of Constru opacua and Luciana B View article View article	PDF s Analysis ton turjannah DF PDF uction on Concrete Column Buarlele DF pDF structures of ST. 37 Steel Undergoing Carburizing Process Using Coal Powder tongan and Junsen Bryan Bia DF	01203
Open abstract Material and OPEN ACCESS Hot Water Extra Muhammad Saleh, + Open abstract OPEN ACCESS Analysis Waste I Helen Adry Irene Si + Open abstract OPEN ACCESS Analysis of Tensi Atus Buku, Salma S + Open abstract OPEN ACCESS	View article Characteristic: Ction on Aspal But Setyawati Yani and N View article Material of Constru opacua and Luciana B View article View article de Tests and Micro alu, Merliana Pangad View article View article	Image: Representation and Marwah Al-Aucado Image: Representation and Junsen Bryan Bia Image: Representation and Junsen Bryan Bia Image: Representation and Junsen Bryan Bia	01203
Open abstract Material and OPEN ACCESS Hot Water Extra Muhammad Saleh, + Open abstract OPEN ACCESS Analysis Waste I Helen Adry Irene Si + Open abstract OPEN ACCESS Analysis of Tensi Atus Buku, Salma S + Open abstract OPEN ACCESS The used of rubi	View article Characteristic: ction on Aspal But Setyawati Yani and N I View article Material of Constru- opacua and Luciana B I View article ide Tests and Micro iau, Merliana Pangad I View article ber material as ad	Image: State of ST. 37 Steel Undergoing Carburizing Process Using Coal Powder Image: State of St. 37 Steel Undergoing Carburizing Process Using Coal Powder Image: State of St. 37 Steel Undergoing Carburizing Process Using Coal Powder Image: State of St. 37 Steel Undergoing Carburizing Process Using Coal Powder Image: State of St. 37 Steel Undergoing Carburizing Process Using Coal Powder Image: State of St. 37 Steel Undergoing Carburizing Process Using Coal Powder Image: State of St. 37 Steel Undergoing Carburizing Process Using Coal Powder Image: State of St. 37 Steel Undergoing Carburizing Process Using Coal Powder Image: State of St. 37 Steel Undergoing Carburizing Process Using Coal Powder Image: State of St. 37 Steel Undergoing Carburizing Process Using Coal Powder Image: State of St. 37 Steel Undergoing Carburizing Process Using Coal Powder	01203
Open abstract Material and OPEN ACCESS Hot Water Extra Muhammad Saleh, + Open abstract OPEN ACCESS Analysis Waste I Helen Adry Irene Si + Open abstract OPEN ACCESS Analysis of Tensi Atus Buku, Salma S + Open abstract OPEN ACCESS The used of rubi Ari Kusuma, Alpius	View article Characteristic: ction on Aspal Buil Setyawati Yani and N I View article Material of Construction Opacua and Luciana B View article View article ile Tests and Micro ialu, Merliana Pangad I View article ber material as ad and Sakaria Randepa	Image: Structures of ST. 37 Steel Undergoing Carburizing Process Using Coal Powder Image: Structures of ST. 37 Steel Undergoing Carburizing Process Using Coal Powder Image: Structures of ST. 37 Steel Undergoing Carburizing Process Using Coal Powder Image: Structures of ST. 37 Steel Undergoing Carburizing Process Using Coal Powder Image: Structures of ST. 37 Steel Undergoing Carburizing Process Using Coal Powder Image: Structures of ST. 37 Steel Undergoing Carburizing Process Using Coal Powder Image: Structures of ST. 37 Steel Undergoing Carburizing Process Using Coal Powder Image: Structures of ST. 37 Steel Undergoing Carburizing Process Using Coal Powder Image: Structures of ST. 37 Steel Undergoing Carburizing Process Using Coal Powder Image: Structures of ST. 37 Steel Undergoing Carburizing Process Using Coal Powder Image: Structures of ST. 37 Steel Undergoing Carburizing Process Using Coal Powder Image: Structures of ST. 37 Steel Undergoing Carburizing Process Using Coal Powder Image: Structures of ST. 37 Steel Undergoing Carburizing Process Using Coal Powder Image: Structures of ST. 37 Steel Undergoing Carburizing Process Using Coal Powder Image: Structures of ST. 37 Steel Undergoing Carburizing Process Using Coal Powder	01203

and statements			012041
Road Reconstrue	tion Modelling ar	nd Challenge in Indrapuri Sub-District, Aceh Besar Regency	
Syahrizal, Muttaqin	Hasan and Taufiq Sa	idi	
+ Open abstract	T View-article	T PDF	
OPEN ACCESS			012042
Principal Compo Areas	nent Analysis App	plication for Determining Factors Influencing Drainage Construction Process in R	esidential
Yulisa Amalia, Eldin	a Fatimah and Cut Z	ukhrina Oktaviani	
+ Open abstract	View article	2 PDF	
OPEN ACCESS			012043
Reconstruction a	and Maintenance I	Priority Buildings in Aceh Besar Regency	
Salman, Mirza Irwa	nsyah and Muttaqin I	Hasan	
+ Open abstract	View article	5 PDF	
Modeling an	d Simulation T	Technologies and Applications	
			01204
OPEN ACCESS		for Construction Development	
OPEN ACCESS A Dynamics Sys	tem of Modelling		
OPEN ACCESS A Dynamics Syst Diah Sarasanty and	tem of Modelling Erna Tri Asmorowat	i i i i i i i i i i i i i i i i i i i	
OPEN ACCESS A Dynamics Syst Diah Sarasanty and + Open abstract	tem of Modelling I Erna Tri Asmorowat	PDF	
OPEN ACCESS A Dynamics Syst Diah Sarasanty and + Open abstract OPEN ACCESS	tem of Modelling I Erna Tri Asmorowat I View article	PDF	01204
OPEN ACCESS A Dynamics Syst Diah Sarasanty and + Open abstract OPEN ACCESS Smart Parking S	tem of Modelling Erna Tri Asmorowat I View article ystem with LabVie	PDF	01204
OPEN ACCESS A Dynamics Sys Diah Sarasanty and + Open abstract OPEN ACCESS Smart Parking S Rahmad Hidayat, F	tem of Modelling I Erna Tri Asmorowat I View article View article ystem with LabVie lerawati, Andrew Ghe	ew Simulator a Mahardika, Ninik Sri Lestari, Sukirno and Givy Devira Ramady	01204

PAPER • OPEN ACCESS

Convolutional Neural Network for object Identification and Detection

To cite this article: Silfia Andini et al 2022 J. Phys.: Conf. Ser. 2394 012018

View the article online for updates and enhancements.

You may also like

al.

- <u>Automated badminton smash recognition</u> <u>using convolutional neural network on the</u> <u>vision based data</u> N A Rahmad, M A As'ari, K Soeed et al.
- <u>A new approach to COVID-19 detection</u> from x-ray images using angle transformation with GoogleNet and LSTM YImaz Kaya, Züleyha Yiner, Mahmut Kaya et al.
- Automatic Classification of Galaxy Morphology: A Rotationally-invariant Supervised Machine-learning Method Based on the Unsupervised Machinelearning Data Set GuanWen Fang, Shuo Ba, Yizhou Gu et

Convolutional Neural Network for object Identification and Detection

Silfia Andini¹, Erni Rouza², Luth Fimawahib², Satria Riki Mustafa², Ahmad Fathoni², Teguh Iman Hermanto³, Anggi Pratama Nasution⁴

¹Universitas Putra Indonesia YPTK Padang, West Sumatra, Indonesia ²Universitas Pasir Pengaraian, Riau, Indonesia ³Sekolah Tinggi Teknologi Wastukancana, Indonesia ⁴Universitas Pembangunan Panca Budi, Medan, Indonesia

Email: ¹silfiaandini68@upiyptk.ac.id,²ernirouzait@gmail.com, ²luthfimawahib@gmail.com, ²satriarikimustafa@gmail.com, ²ahmadfathoniupp@gmail.com, ³teguh@sttwastukancana.ac.id, ⁴anggipratama@dosen.pancabudi.ac.id

Abstract. The goal of this study is to use a Convolutional Neural Network to find the optimum architectural model for classifying cloud images. Cirrus Cumulus Stratus Nimbus uses a source dataset that includes 11 cloud classifications and 2545 cloud photos (CCSN). In this study, the best Convolutional Neural Network is retrained almost fast by transferring education from Google's basic design. Based on the modified Googlenet architecture, the training and testing phases of the classification process are divided into two. The dataset is separated into three sections during the training phase: 70% of the training data, 15% of the validation data, and 15% of the test data. There are two trials to categorize cloud photographs during the test phase, one of which has ten cloud kinds that can be randomly chosen. The precision achieved throughout the training was 44.5%, according to the findings. The results of the two tests are 75%, with an average error of 0.2. In the testing phase, the percentage is 75%.

Keywords: Cloud Image, Classification, Googlenet, CNN, CCSN Dataset

1. Introduction

Today's digital era is in the world. An era in which virtually all aspects of human life are closely related to computer technology [1]. As time goes by, people continue to develop knowledge and technology in order to support and ease their work. Artificial intelligence or more known as Artificial Intelligence is still developing (AI) [2]–[5]. Cloud detection is critical for a large number of tasks for remote optical data sensing. For example, clouds mask the Earth's surface and provide incorrect reflectance values for ground-based targets [6]. Remote sensing clouds have certain specific features including luminosity, color, texture, shape, etc [7]. Cloud detection techniques are employed by cloud investigators with physical cloud parameters such as (a) shape attributes; (b) fusion of cloud net multistage convolutionary features; (c) color transition; (d) cloud densities; (e) cloud shadows [8]. It's the main step of many object recognition and computer vision tasks to extract effective features. Several researchers therefore focused on robust features for a range of tasks of image classification [9]. Currently, much attention is paid to learning algorithms and revolutionary networks (CCN). The algorithm provides the image directly to the convolutionary neural networks, and the algorithm removes the most important features of the image [10]. In the findings indicate that CNN functionality extracted



2394 (2022) 012018 doi:10.1088/1742-6596/2394/1/012018

from profound learning must be taken into account in the most visual recognition tasks [11]. To identify cloud image classifications, priority knowledge is needed, which is learned through identified cloud image types with a similar composition. The data sets of the CCSN (Cirrus Cumulus Stratus Nimbus) divides into 11 different cloud genus (main group): Ci = Cirrus; Cs = Cirrostratus; Cc = Cirrocumulus; Ac = Altocumulus; As = Altostratus; Cu = Cumulus; Cb = Cumulonimbus; Ns = Nimbostratus; Sc = Stratocumulus; St = Stratus; Ct = Contrail. In this experiment, the CNN is used to classify image types of cloud-based objects. The focus is on modeling for cloud-type object classification. Highlights of the paper are:

- a) To address the cloud classification problem, we propose a CNN Learning Transference Model that incorporates state of the art Transfer learning technology.
- b) We conducted cloud experiments collected by the World Metroliferative Organization and the results showed that the Model for Learning Transfer has been effective and potential.

2. Methodology

2.1. Dataset

For cloud detection purposes, we use the Cirrus Cumulus Stratus Nimbus (CCSN). This dataset contains 11 categories. The data set of CCSN includes 2545 images of the Cloud. The representatives of each category are Ci = cirrus; Cs = cirrostratus; Cc = cirrocumulus; Ac = altocumulus; As = altostratus; Cu = cumulus; Cb = cumulonimbus; Ns = nimbostratus; Sc = stratocumulus; St = stratus; Ct = contrail. All pictures are 256 / 256 pixels of fixed resolution with JPEG format.



Figure 1. Example of a Cirrus Cumulus Stratus Nimbus (CCSN) cloud type

2.2. CNN Architecture

Convolutional Neural Networks (CNN) is a deep learning network architecture that can automatically learn how to represent picture features. CNN is part of a particular category of methods of the neural network. The CNN consists of three layer types. The layers can be configured, combined or completely connected. Usually, CNN is two-part structured. The first part of the system, called extraction of functions, uses coalescing and grouping layers. The second part is a classification that uses layers fully connected. The layer description is shown in table 1 for further details [9].

2394 (2022) 012018 doi:10.1088/1742-6596/2394/1/012018

IOP Publishing

Layer Name	Layer Description
Convolutional	The convolution process was performed on the input image using a set of filters
layer	called the kernel. The characteristic map is the operation output.
Pooling layer	In this layer, the convolutionary layer output was reduced while the main
Fully	information contained in the input layer was saved. The bundling process may be
	performed (max or average), the most common kind of bundling is the choice of
	maximum value.
Fully	The extracted features of these layers were used for the classification task in the
Connected	previous layers.
Lavers	

	Table	1.	The	description	of	CNN	lavers
--	-------	----	-----	-------------	----	-----	--------

3. Results and Discussion

A well-trained image classification network can accurately classify images into categories. The trained network's limitation is that it can only classify the trained object to be classified. Assume GoogleNet has been trained to classify over 1000 different objects. If there are objects that are not among those 1000, the network will fail to classify them. As a result, we require a network that can train and classify new data sets. This is referred to as transfer learning. Transfer learning is a deep learning technique that employs existing networks as a starting point for learning new tasks [9]. Transfer learning involves removing a specific task layer from an existing network and adding a new layer so that it can be trained to learn new features for some of the new tasks. Then, using the new data set, this new layer is trained, validated, and tested [8], [10]–[13]. If the network is properly trained with appropriate data sets, it will be capable of classifying recently learned objects.



Figure 2. Architecture Identification of ground monitoring cloud imagery using the CNN Learning Transfer Model

Figure 2 shows that a neural network is trained to classify images by making certain changes to the network architecture. GoogleNet is one of the most popular neural convolution Networks in this study. This article shows the classification of the cloud type by the Google Net neural network (CNN). The layers are modified. The modified architecture layers are the FullyConnectredLayer and ClassificationOutputLayer layers. The FullyConnectredLayer layer renames the layer to 'Cloud Feature Learner', WeightLearnRateFactor = 10, and BiasLearnRateFactor = 10. Whereas the ClassificationOutputLayer layer changes the layer name to Cloud Classifier. Following are the modifications that have been made are shown in Figure 3 by using the Matlab 2021a programming language.

2394 (2022) 012018 doi:10.1088/1742-6596/2394/1/012018

New Amount I Amount Laws	and a second sec		New_Classifier_Layer 30	
at schuldlager	Property +	Value "Doublingture Learner"	Property a	Value
12 of Carvid-boollinger 12 Dr Felikayer	Dopolize Dopolize	(euto) 11	Name	'Cloud Clauifier'
M h/ Canady terdlike ar	- Weighte	11	E Classer	in to
B be kelld app	Per	17.		and the second s
EW RafaligHitter	Weekeen and the second s	Specif.	ClassWeights	none
T 10 General States	Weight day when a coor		OutputSide	"auto"
最'Fer Will Know	Distriction	Sec. 1	1 arrEunction	1 concentrations and
M Inf Daph/Camatronalaniane	Bartang strings	TR	COSPUNCTION	crossentropyer
45 hr file all-mageholing (Dear-	East Farm	0.	Pluminputs.	a designed of the second s
HE In Composed aver	Huminputo	Constant.	InputNames	3x7.cell
E http://www.eductory.com	injuffication	Autual	- New Outputs	0
Tot Sylmexister	NumOutputs	1.000	The second	
an Art Characteriter Department are	Composition of the second	Defauld .	1.1; OutputNames	OiO cell

Figure 3. Modify the GoogleNet architecture layer

Following the modification of the GoogleNet architecture screen, the training process is carried out by dividing the data into three parts, namely Training Dataset of 70%, Validation Dataset of 15%, and Testing Dataset of 15%, which is carried out at random on 2545 cloud images divided into 11 cloud types (Figure 1). The dataset sharing program code is shown below, along with the results of dividing the dataset into three parts (Training Dataset, Validation Dataset, and Testing Dataset), as shown in Figures 4 and 5.

Dataset = imageDatastore('Dataset', 'Include	Subfolders', true, 'LabelSource', 'foldernames');
[Training_Dataset, Validation_Dataset, Testing_	_Dataset] = splitEachLabel(Dataset, 0.7, 0.15, 0.15);
Figure 4 Kode scri	nt dari nembagian dataset

Figure 4. Kode script dari pembagian dataset

Orașe el		Thirting Default		
		80 faiting Colored		
Property + 11 Files 12 Follow 13 Advantatillefumenthoots 13 Advantatillefumenthoots 14 Advantatillefumenthoots 14 Sectors 15 Sector	Velan 25450 ont 164 ont 164 ont 35454 tantaganise 164 oring 1945 9 tantf 9 tantf 164 oring 1945 9 tantf 164 oring 1945 9 tantf 164 oring 1945 1945 1945 1945 1945 1945 1945 1945	Preparty - Fries Fries Fries Fries Fries Lateli Default/DatapartiesDutputFormatis Default/DatapartiesDutputFormatis B. Friesfinn B.	Value (388c) cell hit cell distrant 1 750ch untreparted 3.45 minus "away" Gravef Detectoretwage	
(a)		(b)		
Walking Delayer		N 1st brogilidation		
Property = Frig Feldent Resolute Relation Resolution Levels Default Supportent Default Supportent Exection Resolution	Video Allhi' and Dol and I Allhi' assignment Marting "ang" BreesDatatanitrage	Property = 5 From 5 Folders 6 Adversarial Solignmentham 6 Austices 6 Lateite 15 Supported/AppentFermate 15	West After red bit red After 1 2010 companies List anning "perg" Grand Datateologies	
(a)		(d)		

Figure 5. The results of dividing the dataset into three parts (Training Dataset, Validation Dataset, Testing Dataset).

Figure 5 shows that the number of datasets for Training Dataset (b) is 1782 (70%), the number of datasets for Validation Dataset (c) is 382 (15%), and the number of datasets for Testing Dataset (d) is 381 (15%). (a) The total number of datasets is 2545. The following are the outcomes of the training process, which was carried out with the following parameters:

Minibatch_Size = 11;	
trainingOptions='sgdm';	
MaxEpochs= 10;	
InitialLearnRate= 0.0001;	
Shuffle= every-epoch;	
ValidationData= Resized_Validation_Dataset;	
ValidationFrequency= Validation_Frequency;	
Verbose= false.	

2394 (2022) 012018 doi:10.1088/1742-6596/2394/1/012018



Figure 6. The training process of the GoogleNet architecture

Figure 6 explains that there are two types of plots. The upper plot represents accuracy or acc, while the bottom plot represents error or loss. The lower plot (error plot) shows that there is a decrease in the red line, but there is a flat epoch starting from epoch 2-10, whereas the upper plot (plot accuracy) shows an increase in epoch 1–10. This demonstrates that the formed fit model already has a fairly good accuracy value to use. The training process yielded a 44.5 percent accuracy after 315 minutes, 30 seconds, and 1620 iterations. Then, repeat the testing process with 2 trials based on the training process. The results of five experiments, as shown in Figure 7, are as follows.



Figure 7. Classification test results with 5 trials

Figure 7 shows a tabular explanation of each experimental result using ten different cloud images.

Table 2. Results of the First Experiment							
No	Cloud	Cloud	Prediction	Probability	Accuracy	Conclusion	
	images	type	Results				
1	1.4	Cb	Cb	0.819	81.9%	True	
2		Ns	Ns	0.565	56.5%	True	

Journal of Physics: Conference Series 2394 (2022) 012018 doi:10.1088/1742-6596/2394/1/012018

No	Cloud images	Cloud type	Prediction Results	Probability	Accuracy	Conclusion
3	Excession (has	Cc	Сс	0.916	91.6%	True
4		Cu	Cu	0.543	54.3%	True
5	SW	Ci	Ci	0.667	66.7%	True
6		Ac	Cs	0.349	34.9%	False
7	1	Ct	Ct	0.468	46.8%	True
8		Ns	Ns	0.441	44.1%	True
9		Cc	Cs	0.49.9	49.9%	False
10	-	Ns	Ns	0.367	36.7	True

Note: Ci = cirrus; Cs = cirrostratus; Cc = cirrocumulus; Ac = altocumulus; As = altostratus; Cu = cumulus; Cb = cumulonimbus; Ns = nimbostratus; Sc = stratocumulus; St = stratus; Ct = contrail

In the first experiment, there are two errors with an error value of 0.2 (80% accuracy) among the ten classified cloud types.

Table 3. Results of the Second Experiment							
No	Cloud	Cloud	Prediction	Probability	Accuracy	Conclusion	
_	images	type	Results				
1	<u>*</u>	Cu	Cu	0.887	88.7%	True	
2		Sc	Cs	0.327	32.7%	False	

IOP Publishing 2394 (2022) 012018 doi:10.1088/1742-6596/2394/1/012018

No	Cloud images	Cloud type	Prediction Results	Probability	Accuracy	Conclusion
3		Cs	Cs	0.630	63%	True
4		Cc	Cc	0.972	97.2%	True
5		Cb	Cb	0.510	51%	True
6		Cc	Cc	0.832	83.2%	True
7		Ac	Ac	0.956	95.6%	True
8	52.0	Sc	Cs	0.274	27.4%	False
9	~	Ci	Ns	0.425	42.5%	False
10		Ct	Ct	0.1	100%	True

Note: Ci = cirrus; Cs = cirrostratus; Cc = cirrocumulus; Ac = altocumulus; As = altostratus; Cu = cumulus; Cb = cumulonimbus; Ns = nimbostratus; Sc = stratocumulus; St = stratus; Ct = contrail

In the first experiment, there are three errors with an error value of 0.3 (70% accuracy) among the ten classified cloud types. The average truth accuracy from the two experiments is 75%, with an average error value of 0.25. As a result, even though the accuracy value in training is less than 50%, the model obtained in this experiment produces a high level of accuracy in test results.

4. Conclusions

Based on the experimental results, it is possible to conclude that the architectural modification on GoogleNet for cloud type classification cases can be used with an accuracy value greater than 70%. There may be prediction errors between several types of clouds because they have nearly identical appearances, namely Stratocumulus, Cirrostratus, Cirrus, and Nimbostratus, resulting in a prediction error. Meanwhile, different types of clouds can be accurately predicted because they have a distinct appearance, both in terms of shape and color, making them easier to predict.

References

- [1] W. Mohd, K. Firdaus, W. Khairuldin, A. H. Embong, W. N. Izzati, and W. N. Anas, "The Application of Technology in the Dissemination of Fatwas: A Study on Religious Institutions in Malaysia," *Int. J. Civ. Eng. Technol. (IJCIET*, vol. 9, no. 7, pp. 1590–1596, 2018.
- [2] Budiharjo, T. Soemartono, A. P. Windarto, and T. Herawan, "Predicting tuition fee payment problem using backpropagation neural network model," *Int. J. Adv. Sci. Technol.*, vol. 120, pp. 85–96, 2018.
- [3] Budiharjo, T. Soemartono, A. P. Windarto, and T. Herawan, "Predicting School Participation in Indonesia using Back-Propagation Algorithm Model," *Int. J. Control Autom.*, vol. 11, no. 11, pp. 57–68, 2018.
- [4] A. Waluyo, H. Jatnika, M. R. S. Permatasari, T. Tuslaela, I. Purnamasari, and A. P. Windarto, "Data Mining Optimization uses C4.5 Classification and Particle Swarm Optimization (PSO) in the location selection of Student Boardinghouses," *IOP Conf. Ser. Mater. Sci. Eng.*, vol. 874, no. 1, pp. 1–9, 2020.
- [5] R. Karolina and Y. G. C. Sianipar, "The utilization of stone ash on cellular lightweight concrete," in *IOP Conference Series: Materials Science and Engineering*, 2018, vol. 309, no. 1.
- [6] D. Tuia, B. Kellenberger, A. Pérez-Suay, and G. Camps-Valls, "A deep network approach to multitemporal cloud detection," *Int. Geosci. Remote Sens. Symp.*, vol. 2018-July, pp. 4351–4354, 2018.
- [7] H. Liu, D. Zeng, and Q. Tian, "Super-pixel cloud detection using Hierarchical Fusion CNN," *arXiv*, 2018.
- [8] S. Mahajan and B. Fataniya, "Cloud detection methodologies: variants and development—a review," *Complex Intell. Syst.*, vol. 6, no. 2, pp. 251–261, 2020.
- [9] M. G Alaslni and L. A. Elrefaei, "Transfer Learning with Convolutional Neural Networks for IRIS Recognition," *Int. J. Artif. Intell. Appl.*, vol. 10, no. 5, pp. 49–66, 2019.
- [10] E. Cromwell and D. Flynn, "Lidar cloud detection with fully convolutional networks," *Proc.* 2019 IEEE Winter Conf. Appl. Comput. Vision, WACV 2019, pp. 619–627, 2019.
- [11] C. Gonzales and W. Sakla, "Semantic Segmentation of Clouds in Satellite Imagery Using Deep Pre-trained U-Nets," *Proc. Appl. Imag. Pattern Recognit. Work.*, vol. 2019-Octob, 2019.
- [12] N. Li, H. Hao, Q. Gu, D. Wang, and X. Hu, "A transfer learning method for automatic identification of sandstone microscopic images," *Comput. Geosci.*, vol. 103, no. September 2016, pp. 111–121, 2017.
- [13] I. Nurtanio, Z. Zainuddin, and B. H. Setiadi, "Cloud Classification Based on Images Texture Features," *IOP Conf. Ser. Mater. Sci. Eng.*, vol. 676, no. 1, 2019.