Advances in Intelligent Systems and Computing 1108

S. Smys
João Manuel R. S. Tavares
Valentina Emilia Balas
Abdullah M. Iliyasu *Editors*

Computational Vision and Bio-Inspired Computing

ICCVBIC 2019

Springer

Advances in Intelligent Systems and Computing

Volume 1108

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Editors
S. Smys
Department of CSE
RVS Technical Campus
Coimbatore, India

Valentina Emilia Balas
Faculty of Engineering
Aurel Vlaicu University of Arad
Arad, Romania

João Manuel R. S. Tavares
Faculty of Engineering
Faculdade de Engenharia
da Universidade do Porto
Porto, Portugal

Abdullah M. Iliyasu
School of Computing
Tokyo Institute of Technology
Tokyo, Japan

ISSN 2194-5357 ISSN 2194-5365 (electronic)
Advances in Intelligent Systems and Computing
ISBN 978-3-030-37217-0 ISBN 978-3-030-37218-7 (eBook)
https://doi.org/10.1007/978-3-030-37218-7

This Springer imprint is published by the registered company Springer Nature Switzerland AG
The registered company address is: Gewerbestrasse 11, 6330 Cham, Switzerland

We are honored to dedicate the proceedings of ICCVBIC 2019 to all the participants and editors of ICCVBIC 2019.

Foreword

It is with deep satisfaction that I write this foreword to the proceedings of the ICCVBIC 2019 held in RVS Technical Campus, Coimbatore, Tamil Nadu, on September 25–26, 2019.

This conference was bringing together researchers, academics, and professionals from all over the world, experts in computational vision and bio-inspired computing.

This conference particularly encouraged the interaction of research students and developing academics with the more established academic community in an informal setting to present and to discuss new and current work. The papers contributed the most recent scientific knowledge known in the field of computational vision, soft computing, fuzzy, image processing, and bio-inspired computing. Their contributions helped to make the conference as outstanding as it has been. The local organizing committee members and their helpers put much effort into ensuring the success of the day-to-day operation of the meeting.

We hope that this program will further stimulate research in computational vision, soft computing, fuzzy, image processing, and bio-inspired computing and provide practitioners with better techniques, algorithms, and tools for deployment. We feel honored and privileged to serve the best recent developments to you through this exciting program.

We thank all authors and participants for their contributions.

S. Smys
Conference Chair

Preface

This conference proceedings volume contains the written versions of most of the contributions presented during the conference of ICCVBIC 2019. The conference provided a setting for discussing recent developments in a wide variety of topics including computational vision, fuzzy, image processing, and bio-inspired computing. The conference has been a good opportunity for participants coming from various destinations to present and discuss topics in their respective research areas.

ICCVBIC 2019 conference tends to collect the latest research results and applications on computational vision and bio-inspired computing. It includes a selection of 147 papers from 397 papers submitted to the conference from universities and industries all over the world. All of accepted papers were subjected to strict peer-reviewing by 2–4 expert referees. The papers have been selected for this volume because of quality and the relevance to the conference.

ICCVBIC 2019 would like to express our sincere appreciation to all authors for their contributions to this book. We would like to extend our thanks to all the referees for their constructive comments on all papers; especially, we would like to thank to organizing committee for their hardworking. Finally, we would like to thank the Springer publications for producing this volume.

S. Smys
Conference Chair

Acknowledgments

ICCVBIC 2019 would like to acknowledge the excellent work of our conference organizing the committee, keynote speakers for their presentation on September 25–26, 2019. The organizers also wish to acknowledge publicly the valuable services provided by the reviewers.

On behalf of the editors, organizers, authors, and readers of this conference, we wish to thank the keynote speakers and the reviewers for their time, hard work, and dedication to this conference. The organizers wish to acknowledge Dr. Smys, Dr. Valentina Emilia Balas, Dr. Abdul M. Elias, and Dr. Joao Manuel R. S. Tavares for the discussion, suggestion, and cooperation to organize the keynote speakers of this conference. The organizers also wish to acknowledge for speakers and participants who attend this conference. Many thanks are given to all persons who help and support this conference. ICCVBIC 2019 would like to acknowledge the contribution made to the organization by its many volunteers. Members contribute their time, energy, and knowledge at local, regional, and international levels.

We also thank all the chair persons and conference committee members for their support.

Contents

Psychosocial Analysis of Policy Confidence Through Multifactorial Statistics

Jesús Silva[1(✉)], Darwin Solano[2], Claudia Fernández[2], Ligia Romero[2], and Omar Bonerge Pineda Lezama[3]

[1] Universidad Peruana de Ciencias Aplicadas, Lima, Peru
jesussilvaUPC@gmail.com
[2] Universidad de la Costa, St. 58 #66, Barranquilla, Atlántico, Colombia
{dsolanol, cfernandl0, lromeroll}@cuc.edu.co
[3] Universidad Tecnológica Centroamericana (UNITEC), San Pedro Sula, Honduras
omarpineda@unitec.edu

Abstract. Trust is defined as widespread belief or rooted value orientation in evaluative standards of technical and ethical competence, and in the future actions of a person (interpersonal trust) or an institution (institutional trust). From a psychosocial perspective, trust transcends positive or negative affectivity, alludes to the belief that the behavior of others can be predicted and implies a positive attitude and expectation regarding the behavior of the person or institution. This belief refers to the likelihood that individuals or institutions will take certain actions or refrain from inflicting harm, for the sake of personal or collective well-being. The objective of this study is to examine psychosocial factors related to the interaction between the police and the public that predict the perception of trust in police groups in Colombia.

Keywords: Trust · Police · Colombia · Honesty · Performance

1 Introduction

In the field of security institutions, the police are one of the closest to the public and one of the most relevant to the perception of insecurity and, consequently, to the maintenance of democracy. Trust in the police strengthens the sense of security in citizens, to the extent that police work is perceived to be part of a set of policy actions planned by the rulers in order to improve citizen security in the community [1]. The link between trust, closeness and security stimulates the climate of public collaboration with public institutions, such as the police [2, 3]. In this sense, as some authors point out, criminal incidence, violence and police performance provide information about the trust in the police and the democratic governance of a country [4, 5].

On the contrary, high criminality has been found to undermine confidence in political institutions in general and towards political institutions in particular [6]. When this mistrust occurs in communities with high crime, the sense of vulnerability is even higher and, consequently, the loss of confidence tends to worsen, which is evident, among other aspects, in a decrease in rather than the procurement of private security or

S. Smys et al. (Eds.): ICCVBIC 2019, AISC 1108, pp. 1–7, 2020.
https://doi.org/10.1007/978-3-030-37218-7_1

the exercise of justice outside public proceedings [7–9]. As [10], the inconsistency between democratic norms and poor police action, characterized by poor performance, high corruption, and involvement in crimes, in contexts where criminal incidence has increased, have led to an increase in distrust of the police and a sense of insecurity widely shared by the public. In this regard, [11] he states that distrust of the police sharpens resistance to reporting, particularly in communities with a high crime incidence.

Considering the previous history, and given that there are still few work in the Latin American context that examines how trust in the police is defined [12], incorporating psychosocial variables, such as perception of performance and honesty of the police, the fear of victimization and the perception of insecurity, this study analyses the role of the perception of the performance and honesty of the police, the perception of insecurity, and the fear of victimization, as determinants of trust towards the police in Bogotá, Colombia. In this sense, the experience of victimization, performance and honesty are expected to be predictors of trust in the police.

2 Methodology

2.1 Data

Random sampling and stratified sampling proportional to population density was carried out, in order to select participants from all regions and from the eight delegations that make up the Colombian capital (Bogotá) [13]. To do this, the number of participants in each area was proportional to the number of dwellings inhabited, with a minimum of five participants per area being established to ensure the representativeness of all, especially the least populated.

Under these criteria, 12,458 citizens among men and women participated, residents of the city of Bogotá at the time of the study. In addition, by the sample size it is possible to make predictions with the variables selected here, with a coefficient of determination of .05 and a power of .90 [14].

2.2 Methods

The battery of questionnaires was administered per individual, in interview format, by 102 surveyors previously trained by experts and members of the research group of a university in the Region. This application strategy was chosen to ensure that all items are understood among all respondents. The pollsters are randomly assigned in a balanced way to the four sectors in which the municipality was conventionally divided (north, south, east and west). A supervisor/supervisor and a trainer/trainer coordinated each sector and ensured that at least one trainer and one supervisor were involved in each delegation to resolve any doubts. The completion of the instruments was carried out by the pollsters. In addition, the participation of pollsters, supervisors and participants was voluntary. Participants were informed of the objective and the confidentiality of the data was ensured. 1.46% of respondents refused to participate in the study. In these cases, other participants were selected according to the same criteria show them. The time of application of the questionnaire was between 40 and 45 min [15, 16].

3 Results

The following describes the variables used in the study, the selected instruments and their properties [17].

- *Victimization*. To assess direct and indirect victimization, he wondered whether both respondents and their families had been victims of any crime in Bogota during the past year (2019). To this end, the question was asked "In the last year, have you or the people living in your household been the victims of any crime in Bogota?" The question was coded with two answer options (1 × Yes, 2 × No).
- *Fear of* victimization. To assess the fear of being a victim of crime, the adoption of measures to protect against crime has been used as an indicator.

Measures to protect against crime. This dichotomous scale consists of thirteen reagents that assess the frequency of use of different measures to protect against the possibility of crimes. An exploratory factor analysis with oblimin rotation was calculated that yielded a two-factor structure. The first, physical protection measures, explains 55.45% of the variance and refers to how often measures have been used such as buying and carrying a weapon, installing alarms at home, hiring personal security, taking joint actions with the neighborhood, hire private security on the street or in the region, buy a dog, place fences or fences and increase security on doors or windows.

The second factor explains 12.12% of the variance and alludes to the control of personal information such as avoiding giving telephone information, avoiding giving keys or personal data over the Internet, not providing information to strangers and using caller ID Telephone. The results of the factorial analyses performed are presented in Table 1.

Table 1. Exploratory factor analysis and confirmative factorial analysis for the questionnaire measures to protect against insecurity

Protective measures	Exploratory factor analysis		Confirmatory factor analysis*: standardized solution***	
	F1	*F2*	*F1*	*F2*
Hire personal security	.86	.44	.31	
Hire private security on the street or colony	.82	.39	.37	
Don't give phone information	.34	.82		0.60
Place fences, fences	.81	.48	.39	
Get a dog	.82	.45	.29	
Putting extra locks on doors/windows	.79	.57	.39	
Don't give keys or data online	.33	.73		0.73
Take joint action with your neighbors	.85	.44	.51	
Install alarms at home or work	.84	.45	.63	
Not giving information to strangers	.52	.72		0.59
Buy and carry a gun	.88	.52	.24	
Use phone call ID	.51	.75		0.53

*Adjustment rates of confirmatory factor analysis: [S-B s2 s 375.82, gl .47, $p < .001$, CFI. .93, RMSEA .05 (.04, .05)]. ***Significant coefficients ($p < .001$)

Table 2. Exploratory factor analysis and confirmatory factorial analysis for the Crime frequency scale in the colony

Protective measures	Exploratory factor analysis		Confirmatory factor analysis*: standardized solution***	
	F1	*F2*	*F1*	*F2*
Vandalism	.84	−.39	.75	
Drug sales	.83	−.52	.81	
Robbery of people	.76	−.43	.67	
Murder	.54	−.82		.84
Assault	.76	−.43	.65	
fraud	.44	−.81		.76
Sex offences	.44	−.88		.78
Kidnapping	.46	−.87		.75
Drug use	.81	−.50	.73	

*Adjustment rates of confirmatory factor analysis: [S-B s2 x 173.13, gl .22, $p < .001$, CFI .98, RMSEA .05 (0.04, 0.06) ***Significant coefficients ($p < .001$).

– *Type of crime in the region.* The frequency of different crimes in the region was assessed on a Likert scale consisting of eleven reagents, with a range of five response options (not frequent, rare, regular, frequent and very frequent). An exploratory factor analysis with oblimin rotation was calculated, resulting in two factors. The first, called violence and drug use, explains 54.22% of the variance and refers to the frequency with which drug-dealing, drug use, vandalism, robbery and assault occur.

The second factor, serious crimes, explains 12.31% of the variance and groups together criminal acts of seriousness: sexual offences, kidnapping, fraud and homicide. Reagents "threats" and "injuries and quarrels" have been eliminated because they have similar saturations in both factors, therefore they are complex items saturated with uncertainty. The final scale consists of nine reagents. Cronbach's alpha coefficient for factors is .84 and .88, respectively. Table 2 contains the results of exploratory and confirmatory factorial analyses.

– *Factors that promote crime*. This scale is composed of twenty reagents that measure the perception of citizens of possible causes that favor the increase of crime. The Likert scale presents a range of five response options (totally disagree, disagree, disagreement, agreement, agreement, and total agreement). An exploratory factor analysis was performed with oblimin rotation that yielded a three-factor structure. The first, psychosocial factors, explains 42.93% of the variance and alludes to the following causes: [crime] is a way to obtain easy resources, bad companies, economic needs, loss of values and lack of empathy or concern for other. The second factor, corruption and institutional impunity, explains 11.62% of the variance and groups the reagents as corruption, impunity and decomposition of the institutions.

Finally, the third, socialization factors, explains 8.43% of the variance and encompasses the reagents that allude to socialization processes: lack of recreation spaces, learning from childhood, influence of the media, and discrimination. The Cronbach alpha obtained for the factors is .82, .80 and 0.63, respectively.

– *Trust in security institutions.* It assesses the public's trust in public security institutions. The Likert scale consists of seven items with five answer options (unreliable, regular, reliable, very reliable). An exploratory factor analysis was performed with oblimin rotation that showed a single-factor structure that explains 61.77% of the variance. Cronbach's alpha obtained is .90.

Performance and Honesty in security institutions. This Likert scale consists of seven reagents to measure the performance of security institutions, with five response options (very poor performance, poor performance, regular, good performance and very good performance), and seven that evaluate honesty, with five response options (nothing honest, dishonest, regular, honest and very honest). A factor analysis with oblimin rotation showed the presence of two factors that explained 66.44% of the variance. The first, which explains 53.80% of the variance, groups the reagents related to the performance of the Preventive Police, the Transit Police, Judicial Agents, Local and Neighborhood Round, State Police, Federal Preventive Police and Army. The second factor explains 11.64% of the variance and groups the reagents that measure the perception of honesty towards these institutions.

Involvement in security. This Likert-type scale with five response options (completely disagree, disagree, neutral, agree, and completely agree) is composed of five reagents that assess the weight of the involvement of the following agents in the safety of Bogota: One self; neighbors, government, public security institutions, and society. A factor analysis with oblimin rotation was performed showing a one-factor structure that explains 53.67% of the variance. Cronbach's alpha obtained is .80.

Willingness to participate in actions that promote safety. This Likert scale with five response options (nothing, little, from time to time, much and always) is configured by eight reagents that evaluate availability to participate in the following actions or activities associated with security: organization neighborhood, promoting more values in the family, recovering public spaces, generating spaces of coexistence, promoting sport and recreation, instilling culture, promoting arts and crafts workshops, and conducting community work. A factorial analysis with oblimin rotation that has shown a one-factor structure explaining 64.89% of the variance was calculated. Cronbach's alpha obtained is .96.

Provision to do justice outside the law. This dichotomous questionnaire has two answer options (1 × Yes, 2 No) asking what crimes you are willing to do justice outside the law. This questionnaire consists of the twelve reagents that constitute crimes such as theft/assault, express kidnapping, abuse of authority, homicide, abuse of trust, threats, extortion, property damage, injury, corruption, fraud, and sexual offense. A factor analysis with oblimin rotation was performed showing a single-factor structure that explains 62.77% of the variance. Cronbach's alpha obtained is .93.

Subsequently, a logistical linear regression was performed with the variables included in the t-test, in order to know their specific weight in predicting trust towards police groups, such as security institutions. Trust in the various security institutions that coexist in the region was used as a dicomic dependent variable.

The bus test on the coefficients of the model indicates that the variables introduced in the regression improve the fit of the model ($*^2$ (19) $\times$ 1365.70; p .000). The value of the −2 logarithm of likelihood (−2LL) is 644.69. In addition, the R-squared coefficient of Cox and Snell (.60) indicates that 60.1% of the dependent variable variation is explained by the variables included in the analysis. Similarly, the value obtained with the R squared of Nagelkerke (.83) indicates that the calculated regression explains a variance rate of 80.3%. Both values indicate that the model calculated in the logistic regression shows an appropriate fit and validity. The proportion of cases correctly classified by the regression model has resulted in 94.1% for low confidence and 93.3% for high confidence, so it can be verified that the model has a high specificity and sensitivity.

The variable that most affects trust in security institutions is the perception of honesty of these institutions (Wald x 214.56; p < .00; B x 2.80; Exp. (B) x 19.23), to the extent that those who consider security institutions to be honest are 18.72 times more likely to present high confidence towards them. Second, it has been found that the appreciation of the performance of security institutions by citizens predicts confidence, in the sense that those who positively value the performance of these institutions are 4.88 times likely higher than have high confidence. (Wald s 68.14; p < .000; B x 1.45; Exp. (B) x 4.88). Similarly, citizens who are less willing to exercise justice outside the action of security institutions are 2.10 times more likely to have high confidence in the institutions (Wald 5.44; p < .05; B…73; Exp. (B) x 2.50). In addition, having higher education increases by 1.77 the likelihood of having confidence in institutions (Wald s 3.74; p < .05; B…53; Exp. (B) −1.45).

4 Conclusions

The objective of this study has been to examine the psychosocial factors, related to the interaction between police groups and citizens, involved in the process of building trust towards the police in the municipality of Cuernavaca. A poor assessment of the various security agents can be seen from the previous analyses, a trend that has been found in previous work [5, 8, 10, 16].

With regard to the determinants of the institutions' trust through logistic regression analysis, the results partially confirm the expected relationships. Thus, it shows that the main predictive factor of trust is honesty; in other words, people who perceive security institutions as honest and very honest show them greater confidence. In fact, honesty carries more weight than performance in predicting trust in police groups, something that has not been highlighted in previous studies. This finding is suggestive, since it makes it possible to underline the importance of the values and the ethical-moral dimension of the institutions and their implications, both in corruption and in the relationship with citizens.

Compliance with Ethical Standards.

- All authors declare that there is no conflict of interest.
- No humans/animals involved in this research work.
- We have used our own data.

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Human Pose Detection: A Machine Learning Approach

Munindra Kakati and Parismita Sarma(✉)

Department of Information Technology, Gauhati University, Guwahati, India
kakatimunindra@gmail.com, parismita.sarma@gmail.com

Abstract. With the recent advancements in computer science and information technology, computers can now leverage human-like abilities in their operations. Image processing and computer vision technology made many practical applications easy and thus making our life comfortable with machine aid. Medical diagnosis and automatic car driving are two prominent examples in this field. Different types of human poses will be observed in our day to day life. The poses are distinguished from each other at the joints of body parts. In this paper we will discuss the methods to identify four fundamental human poses viz. sitting, standing, handshaking and waving. We are proposing here a framework which can automatically recognize the aforementioned four human poses in any angle or direction from the digital image. For working in this frame work we have created a image database of our own, which is described in subsequent chapter. Our working methodology involves image processing and neural network techniques. Finally, the performance of the proposed system is illustrated.

Keywords: Human pose · Computer vision · Neural network · Image processing

1 Introduction

1.1 Importance of Human Pose

Human beings will quite often express their mental and physical health with different types of poses framed with different body parts. Proper recognition of those poses will help to understand the current mental as well as physical condition of the particular person. Human pose detection can be marked as the initial stage of human behavior analysis [1]. Now a days researchers are interested to recognize human poses with the help of computer. If any human pose can be automatically recognized with the help of computer then many other applications like medical diagnosis, crime detection will be easier for full machine implementation. This project has so many applications in our day to day life. We can consider it as advanced level reasoning activity identification in the field of human computer interaction. This work mainly focuses on localizing the parts or joints of human body from the digital image.

Pose Estimation

As already we have mentioned that human pose will be straight or bent of different parts present in the human body. This topic is a study on the most emerging research

S. Smys et al. (Eds.): ICCVBIC 2019, AISC 1108, pp. 8–18, 2020.
https://doi.org/10.1007/978-3-030-37218-7_2