

Final Year Project Report
Human Gender & Stature Estimation Using Anthropometry



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Dedication

This work is mainly dedicated to the

Victims of the Mass Disaster

By mean of this work we have tried to provide our contribution towards the identification of an individual.

Every challenging work needs self-efforts as well as guidance of elders especially those who were very close to our heart.

My humble effort I dedicate to my Sweet and loving

Father and Mother

Whose affection, love, encouragement and prays of day and night make me able to get such success and honor,

Along with all hard working and respected

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بِسْمِ اللّٰهِ الرَّحْمٰنِ الرَّحِیْمِ

If you are grateful [to Me], I shall most certainly give you more and more." Quran 14:7 - Surat Ibrahim

In the Name of Allah, the Most Beneficent, the Most Merciful. First and foremost, we must acknowledge our limitless thanks to Allah, the Ever-Magnificent; the Ever-Thankful, for His help and bless. We are totally sure that this work would have never become truth, without His guidance. We owe a deep debt of gratitude to our university for giving us an opportunity to put our efforts in this work. We are grateful to some people, who worked hard with us from the beginning till the completion of the present research particularly my advisor Dr.Sajid Mahmood, who has been always generous during all phases of the research, and we highly appreciate the efforts expended by Dr. Nouman Rasool as a co-Advisor. We would like to take this opportunity to say warm thanks to all our friends, who have been so supportive along the way of doing this thesis. We owe profound gratitude to all the volunteers who have helped and give us their precious time. We also would like to express our wholehearted thanks to our families for their generous support they provided us throughout our entire life and particularly through the process of pursuing the graduation degree. Because of their unconditional love and prayers, we have the chance to complete this thesis. Without the support of all these peoples, this study would not have been possible.

ABSTRACT

The present research aims to verify the utility and reliability of hand and footprint for the identification of an individual. We have work on research papers, for which foot and hand prints of 283 volunteers were taken from all over the Punjab (Pakistan) including 142 males and 141 females aged 18-65. Different foot parameters i.e. Ridges of different areas, the length of toes, toe lengths ratios and Heel-Ball index and hand measurements i.e. Hand finger lengths, hand breadth and ratios of hands were obtained. Various methods have been used for this purpose i.e. ROC curve analysis and different algorithms for gender classification (Naïve Bayes, j48, Random Tree, Random Forest and REP Tree). The accuracy rates for gender determination through classification algorithms were high as compare to gender determination through ROC curve analysis. The study was conducted on Stature estimation with the help of foot parameters by correlation analysis method with reasonable accuracy.

A desktop based software was developed which provides basic functionality related to gender classification and height estimation with the help of hand and foot parameters. In which one can identify the gender and stature through different combinations of hand or foot parameters required by the system. Data mining techniques like classification algorithms for gender determination and regression analysis for stature estimation with more than 80% accuracy.

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DEFINITIONS AND ACRONYMS

1)	SW	Software
2)	HW	Hardware
3)	FT	Foot Toe
4)	HF	Hand Finger
5)	HB	Heel Ball
6)	UC	Use Case
7)	GSI	Gender and stature identification
8)	UML	Unified Modeling Language
9)	ERD	Entity Relationship diagram
10)	NADRA	National Database and Registration Authority
11)	RFL	Right Foot Length
12)	LFL	Left Foot Length
13)	BBR	Breadth Ball Right
14)	BBL	Breadth Ball Left
15)	BHR	Breadth Hand Right
16)	BHL	Breadth Hand Left
17)	RD	Ridge Density
18)	ROC	Receiver Operating Characteristic
19)	SD	Standard Deviation
20)	SE	Standard Error
21)	BAH	Breadth at Heel
22)	BAB	Breadth at Ball
23)	LGT	Left Greater Toe
24)	LMB	Left Medial Ball
25)	LLB	Left Lateral Ball
26)	LHB	Left Heel Ball
27)	RGT	Right Greater Toe
28)	RMB	Right Medial Ball
29)	RLB	Right Lateral Ball
30)	RHB	Right Heel Ball

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1 INTRODUCTION

Objectives of this Chapter

- Introduction to the GSI system
- Problem Overview
- Research Objectives
- Scope
- Methodology
- Significance
- Motivation behind this research is to do something for our beloved country. Something that could be helpful in overcoming the current situation of Pakistan, as a minor contribution towards betterment of the land. For this purpose, we find out the problems that are often faced by forensic investigators. One of the major problem which we find out was a problem of identification of persons like victims of blasts and crashes etc. Therefore, we decided to provide a solution to the basic need to identify those persons who remains unidentified in any situation like crash, bomb blast and so on. This will also helpful or assist the investigation officials in order to identify the criminals in less time.