

A Review Study on Age estimation from footprints

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Abstract

Footprints generated on any surfaces when a person walks, runs, jumps or stand on that surface. Footprints is prepared under different condition. If the surface is soft or wet so in such circumstances the footprint of the man walking on him will be ready which is known as sunken foot print. If the surface is hard considered two situations first is if the surface is covered with powdery or liquid substance, dust and second is if the foot sole is covered with dust, mud, blood or any liquid substance. Every person's footprint has some speciality like each person feet are very different in the shape. Footprints impression can provide important evidence in crime scene investigation. When the foot print is found at the crime scene then that can be valuable evidence and the characteristic of his measurement may aid in the identification of the offender. In footprints gait pattern analysis are very important to determine the features of footprints. Human gaits are pattern of limb movement which involve both the upper and lower body parts. Human gait may be defined as bipedal, biphasic forward propulsion of the centre of gravity of human body. These pattern in terms of gait pattern. Gait pattern analysis provide a particular track mark, and by this track mark can find out the height of the person walking, age estimation of person, sex estimation of person and footprints analysis etc. This review paper study on various things like age, sex, height from footprints analysis.

Keywords: Age Estimation, Sex Estimation, Height Estimation, Gait Pattern Analysis

Introduction

Footprint analysis is a very ancient art. In India, a class of Great peoples in the state of Punjab, Rajasthan, Maharashtra etc. Who were known as (“khoji”) to patch the footprints (hooves) of runaway or stolen animals and were very helpful recovering them When crime committed in the village (“khoji”) identify suspect.

Footprint impression marks –the marks made by the outside surface of the sole of the footprints. The distinctive pattern found at the crime scene, they are among most commonly found evidence at crime scene and present more frequently than fingerprint [1].

The condition in which foot print form it should be wet and it can also form on hard surface. If the surface is wet, sunken foot print is formed. If the surface is hard than the two conditions made from footprint. If dust or liquid matter accumulates on the surface. If there is oil, mud, blood or any other fluid in the bottom of the footprint – surface footprint formed. Footprint marks can be broadly broken into two classes: 2 dimensional ex- on floor, on carpet etc 2- 3dimensional ex- snow, wet dirt etc [2-3,13,15].

Gait pattern – footprints created by person walk or run. By this we can identify walking direction, foot direction, foot angle, foot length, step width. Persistent footprints are formed when a person walk or run which is known as gait pattern. Every single person walks in this world differently and the characteristics of each person’s gait are individual and sculpts his footprint in a repeating pattern.

The following information can be obtained from the study of ways pf person’s gait pattern. Age of the person- We can get the information of walking person he/she is young or old on the basis of gait pattern. As compare to the young person old person step are small and some places stick mark can also be present.

Sex determination by gait pattern analysis-By studying the gait pattern, male or female can be inferred but there is not much accuracy in it. The roundness of the thumb of a woman is less than that of the man. Identity can also be established on the basis of the women of Hindu religion in India wearing a toe ring in their legs. There is also difference between the length of adult male and adult female step.

Height of the person- The height of a person can be estimated from the length of the step. The person whose foot is short and the step length is also short and the person whose foot is long and the step length is also long [4,16,17,20].

When a crime scene investigator arrives at the scene, it is often difficult to determine that person unless the footprints allow counting their number, the direction in which they were moving, the speed at which they were moving, and were they carrying any heavy object. This can be estimated from the analysis of foot print. [5,6].

The footprints left on the ground in the vicinity of the place where the crime took place have often become the reason for the arrest for the criminal. To identify the foot print, sample is taken from the suspect and the same type of surface should be selected for the taking the foot print of the sample the kind of surface on which the footprints were found at the crime scene. The suspect is made a cast of plaster of paris of a rough footprint prepared by walking on the same type of surface [7,20].

To protect footprints- Footprint are more likely to be destroyed than other types of physical evidence left by the criminals at the crime scene. Footprints generally can be destroyed by unknown person or person visiting to the crime scene and foot print can be preserved carefully [1,8-10].

Casts of foot prints may be taken by smearing the prints with oil and pouring in liquid plaster of Paris, or by dusting them with powdered stearic acid or with solid paraffin, which may be melted by holding a hot iron over the prints. This process may be repeated until the cast obtained is sufficiently thick to be removed [11].

Some hospitals have started the process of taking impressions of the footprints of newborn children. So that the children do not mix with each other or they can also be prevented from deliberately stopping the profession of change [12,18,19].

Location of Footprints

Crime scene.

Nearby area of crime scene.

On the way of arrival and exit at the scene of the incident.

Instead of gathering planning time before the crime scene and dividing stolen property [5,20].

Method of Preservation and Recording of Footprints

Different types of method are available to record footprints are-

Photography

Photography is necessary because it maintain record and in most of the cases footprint can destroy. photography of footprints should be in different method. The camera lens should be parallel to the surface of the footprint.

In addition to sunlight, the camera's flash light should be used so that all the details are shaded [8,20].

Tracing

Tracing is the easiest method to record surface footprint. Different step involved in the tracing method is-

First of all, the mirror and the celluloid sheet are placed above the footprint at a minimum distance in such way that the mirror does not adjoin the footprint

The mirror should not be removed from it place until the tracing work is completed.

Thin lines should be drawn with the help of pencil or pen [11,20].

Casting

The sunken footprint is recorded by the casting method. Medium sunken footprint is more suitable for this as it is less prone to destruction. For casting, plaster of paris (p.o.p) sulfur etc. powder is used. But plaster of paris is the easiest to use and best cast is prepared from it [9,20].

Holography

Holography technique is used for the latent footprint when a person sets footprint on the surface of the carpet, it threads get stuck who slowly come to the real state generally this

action is not visible, but the laser rays are the capable of recording them on the photographic plate. This technique is called holography and photograph is called hologram [3,20].

Electrostatic Technique

This technique is extremely useful for dusty invisible footprints on flat surfaces. In this technique dust particles are lifted as absorbed particles on the high potential vinyl sheet and photograph is taken and located on gelatin paper. In this process, first of all, a black coloured sifted size vinyl sheet is placed over the potential footprint sheet with an aluminium sheet approximately 15,000 potential volt generates. In this dust particle of foot prints stick according to the size of vinyl sheet and finally photographed [20].

Discussion

By analysis of foot impressions can reveal much information the timing of activities of an individual at a crime scene, as well as the individual's level of involvement.

For example, if one set of foot impressions is always overlain by those of others that can be demonstrated to be associated with the crime, it is reasonable to assume that the maker of the trodden-over impressions was present prior to the occurrence of the crime.

It may not be possible to determine the length of time prior to the event that this individual was present, but this conclusion would support a determination of innocence or noninvolvement in the crime.

If, on the other hand, the set of impressions in question always overlies those unquestionably in association with the crime, it suggests that they were made by someone happening onto the scene subsequent to the crime. The most important kind of impressions for analysis of the events at the crime scene illustrates interaction among the participants in the events.

Conclusion

Comparison of the footprint found at the crime scene with the suspect's footprint can play an important role in establishing the identity of the suspect. If a large number of the suspicious foot prints are found at the crime scene, then in this

situation the number of suspects can be determine which were present on the time of when crime was committed.

By analysis footprints we can identify age, height, sex and gait pattern. Approximate number of criminals is determined when the footprints of different structure are done at the crime scene. Common structure- Legs structure is very different from person to person. It may be flat, circular or generally in fragmented form.

Edge of the footprint- The edge of the footprint also has its own speciality. It describes the side of the heel and the inner and outer edge of the foot. It can be oval, round, straight inwards and bulging outwards.

References

1. Mukhra R, Krishan K, Nirenberg MS, Ansert E, Kanchan T (2020) Comparative analysis of static and dynamic bare footprint dimensions in a north Indian population, *Forensic Sci Int* 308: 110169.
2. Nirenberg M, Ansert E, Campbell J, Curran M (2020) Chasing Ghosts: An Investigation of the Ghosting Phenomenon in Footprints. *Sci Justice* 60: 432-437.
3. Mukhra R, Krishan K, Kanchan T (2018) Bare footprint metric analysis methods for comparison and identification in forensic examinations: a review of literature. *J Forensic Leg Med* 58: 101-112.
4. Vernon DW, DiMaggio JA (2017) *Forensic Podiatry: Principles and Methods*, 2nd ed., CRC Press, New York.
5. Vernon W, Simmonite N, Reel S, Reidy S (2017) An investigation into the cause of the inner dark areas and outer lighter areas (ghosting) seen in dynamically- created two-dimensional bare footprints, *Sci. Justice* 57: 276-282.
6. Nirenberg MS, Krishan K, Kanchan T (2017) A metric study of insole foot impressions in footwear of identical twins, *J. Forensic Leg Med* 52: 116-121.
7. Burrow JG (2016) Bare footprint analysis comparing two collection methods adopting the reel measurement system and adobe photoshop. *Forensic Res Criminol Int J* 2: 50.
8. Nirenberg M (2016) Meeting a forensic podiatry admissibility challenge: a Daubert case study. *J Forensic Sci* 61: 833-841.
9. Krishan K, Kanchan T, DiMaggio JA (2015) Emergence of forensic podiatry—a novel sub-discipline of forensic sciences, *Forensic Sci Int* 255: 16-27.
10. Hemy N, Flavel A, Ishak NI, Franklin D (2013) Estimation of stature using anthropometry of feet and footprints in a Western Australian population. *J Forensic Leg Med* 20: 435-441.
11. Kanchan T, Krishan K, Shyamsundar S, Aparna KR, Jaiswal S (2012) Analysis of footprint and its parts for stature estimation in Indian population. *The Foot* 22: 175-180.
12. Reel S (2012) Development and evaluation of a valid and reliable footprint measurement approach in forensic identification, PhD Thesis, University of Leeds, York St John University.
13. Karimi MT, Pol F, Pol A, Fereshtenejad N, Rafiaei M (2011) Footprint Indexes in Static and Dynamic Conditions. *J Rehabil Sci* 7: 599-604.
14. Putti AB, Arnold GP, Abboud RJ (2010) Foot pressure differences in men and women. *J Foot Ankle* 16: 21-24.
15. Atamturk D (2010) Estimation of sex from the dimensions of foot, footprints, and shoe, *Anthropology. Anz.* 68: 21-29.
16. Luo G, Houston VL, Mussman M, et al. (2009) Comparison of male and female foot shape. *J Am Podiat Med Assn* 99: 383-390.
17. Krishan K (2008) Establishing correlation of footprints with body weight—forensic aspects, *Forensic Sci Int* 179: 63-69.
18. Krishan K (2007) Individualizing characteristics of footprints in Gujjars of north India—forensic aspects. *Forensic Sci Int* 169: 137-144.
19. Oberoi DV, Kuruvilla A, Saralaya KM, et al. (2006) Estimation of stature and sex from foot print length using regression formulae and standard foot print length formula respectively, *J. Punjab Acad. Forensic Med Toxicol* 6: 5-8.
20. [Http/Uppolice.gov.in/article/en/forensic-laboratory](http://Uppolice.gov.in/article/en/forensic-laboratory).

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