



Study Relation Between Different Gait Characteristics Of Varying Height In Male And Female

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Abstract: This study has been undertaken to investigate the Gait pattern characteristics in varying height in male and female. In which particular height of different person is taken in which 50 males and 50 female samples is taken. This study particularly focus on to record the systematic pattern of the people with varying height and to analysis the correlation between different categories of person with same height in which step length, Step width, Foot length and foot angle is taken

Step length, step width, foot length, foot angle

GAIT PATTERN

Gait refers to “locomotion achieved through the movement of human limbs. Human gait is defined as bipedal, biphasic forward propulsion of center of gravity of human body, in which there are alternate sinuous movements of different segments of the body with least expenditure of energy.

Gaits can be roughly categorized into two groups: the natural gaits that nearly every human will use without special training and the specialized gaits which person use under specific conditions and situations.

CONCEPTS OF FORENSIC GAIT ANALYSIS

Forensic gait analysis was first defined by “Kelly (2000) as the identification of a person or person by their gait or features of gaits, usually from closed circuit television (CCTV) footage and comparison to footage of a known individual. Gait recognition was later defined by Grant (2006) as the process of identifying people by the unique characteristics of their manner of walking, where features are extracted from a persons gait in order to recognize them”. The height of an individual can be determined by his/her footprint and shoe print. The foot tends to be approximately 15% of the persons average height . At times series of footprint are left at the scenes of a crime forming a recognizable gait cycle. The information gathered during examination of footprint and also on CCTV may be value of forensic application. Individual characteristics of footprints and gait, like numerous creases, flatfoot character, horizontal and vertical ridges , corns, deformities, step length, stride length, and stance phase, swing phase, step time, cadence and velocity observed on CCTV can help the forensic examiner in case pertaining to criminal identification.

NEED OF GAIT ANALYSIS

The gait analysis is aim is to understand a human behavior which specially involves the process of analyzing the human image sequence for detecting, tracking and recognition of people. Gait signatures extracted from video can be used as a consistent clue to identify individual. Gait advantage are that it is non invasive and it appears to difficult to camouflage, especially in cases of serious crime. Therefore with reasonable accuracy to provide by the analysis, gait can be used in forensic such as prison security and criminal identification and also has a big potential to implement in wide range of civilian application areas. While there are many types

of gait such as walking, crawling, jogging, running and skipping, the action that is focused only on human walking. There are some features in a person's gait that is common for everyone

PREREQUISITES OF GAIT:

1. The ability to support or assume upright position.
2. The ability to maintain balance in upright position during static and dynamic situations.
3. The ability to develop or create new step forward.

GAIT CYCLE The gait cycle is used to describe the complex activity of walking or our gait pattern. The cycles describe the motions from initial placement of the supporting heel on the ground to when the same heel contacts the ground for the second time.

GAIT CHARACTERISTICS

When a person while walking or running makes a series of foot prints or impression it is called a walking picture or walking ensemble. It is possible to deduce some of the characteristics of the owner's manner of walking pattern is found to be highly individualistic. It may therefore be of great value to study them. The gait pattern characteristics is as follows

DIRECTION LINE: - it is an imaginary line, which indicates the direction in which person is walking or moving. It is a straight line.

THE GAIT LINE: - in normal person walks the gait line coincides with the direction line and runs along the inner side of both prints. However, it is often irregular, varying with each step because of the manner of putting down the foot. It may be zigzag due to pattern proceeding with wide leg apart. It is more broken in stout person and in pregnant woman, because they walk with their feet wide apart to maintain equilibrium. Broken walking lines suggestive of sluggish person, pregnant woman, drunkards and person carrying booty or load on their backs.

THE FOOT LINE: - this is a straight line running through the longitudinal axis of the footprint. It is a line, which passes through the second toe to the center of the heel. It is simply a line of reference in the foot itself and its inclination to the direction line shows the angle at which each foot is put down.

THE FOOT ANGLE: - the angle between the foot line and the direction line is known as the foot angle. It can be highly characteristics, and does not change much except when the subject stands still, runs, walk up, and down carries heavy load. The foot angle of a man is often larger than that of woman. The normal foot angle is 30 to 32 degrees. It may vary with different individuals and may also be different for the left and right foot of the same individual.

THE PRINCIPAL ANGLE: - this is the angle between the foot lines of the two feet, and is thus the sum of two foot angles. The principal angle will vary depending upon the deformities in the left and right foot.

THE STEP LENGTH: - this is the distance between the centers of two successive heel prints. It depends on the size of walker, his habit, and his speed. Generally, a tall person takes longer steps than the shorter one, walking at the same speed. Person with hernia or pelvic disorders often take steps, which are very short in proportion to the length of their legs. Some railway workers, on the contrary, may be accustomed to taking exceptionally long steps because of walking on railway tracks. The step length varies from 20 to 40 inches. It is said that the 27 inches on the average for slow walking and 35 inches for fast walking person running take step length over 40 inches for fast walking. Persons running take step length over 40 inches. A changing step length, in the same walking picture, is an indication that the person is limping. The normal legs take a longer step than the shorter ones.

THE STEP WIDTH:- this is the distance between the parallel drawn in the direction of the direction line touching the inner side of left and right foot.

DEDUCTION FROM WALKING PATTERN

Age of the person:

It may be possible to know that whether the tracks marks are that of a young person or old person. A young may show twisting action of the toes and the ball of the foot. Old persons during their walk drag earth by their toes. Their step length will be comparatively shorter. Marks of the stick may also be found on the side of the foot impression.

The Sex:

The sex of an individual leaving track marks can be found out by measuring the step length and other characteristics. Step length of an adult woman is between 18 to 22 inches and that of an adult male between 25 to 28 inches. The ball of a foot in woman is comparatively narrower than that of man. The unimpressed part in women foot is more pronounced. Woman press their feet without any inclinations towards the outside and the first two toe kick the earth forward, whereas the other three leaves stationary marks. Some Indian woman wear rings on the toe, and if they walk barefooted are likely to leave their marks.

THE HEIGHT OF A PERSON:

The length of a footprint is not always suggestive of the persons height, but generally a longer footprint say, 10 to 12 inches and step length exceeding 30 inches may suggest it to be that of a tall person (near about 5' 10" to 6"). A short person will not only have a smaller foot (say 6 to 8 inches) but would also register a shorter step length. Thus a step length of about 20 or 24 inches with a foot whose length is about 6 to 8 inches suggest a person who is not more than 5'3" or 5'4" in height.

REVIEW OF LITERATURE

Gait analysis in forensic medicine (Peter K. Larsen Erik B. Simonsenb, Niels Lynnerup)

We have combined the basic human ability to recognize other individual with functional anatomical and biomechanical knowledge, in order to analyze the gait of perpetrator as recorded on surveillance video. The perpetrators are then compared with similar analyses of suspects. At present we give a statement to the police as to whatever the perpetrator has a characteristics gait pattern compared to normal gait, and if a suspect has a comparable gait pattern. We found agreement such as: limping, various instability in the knees at heel strike, larger lateral flexion of the spinal column to one side than the other, inverted ankle during stance, pronounced sagittal head-movements and marked head-shoulder posture. Based on these characteristics features, we state whether suspect and perpetrator could have the same identity but it is not possible to positively identify the perpetrator. Nevertheless, we have been involved in several cases where the court has found that this type of gait analysis, especially combined with photogrammetry, was a valuable tool. The primary requisites are surveillance camera s recording with sufficient, frequency ideally about 15 Hz, which are positioned in frontal and preferably also in profile view.

Forensic gait Analysis and recognition: Standards of Evidence admissibility: Carolyn J. Rando

Gait is one biological characteristic which has strong research interest due to its potential use in human identification. Although almost two decades have passed since a forensic gait expert has testified to the identify of a perpetrator in court, the method remains insufficiently robust, considering the recent paradigm shift witnessed in the forensic science community regarding quality of evidence. In contrast, technological advancement have taken the lead, and research into automated gait recognition has greatly surpassed forensic gait analysis in terms of the size of acquired datasets and demographic variability of participants, tested variables, and statistical evaluation of results. Despite these advantages gait recognition presents with different problems with are yet to be resolved. Therefore, courts should treat gait evidence with caution, as they should any other form of evidence originating from disciplines without fully established codes of practice, error rates, and demonstrable application in forensic scenarios.

METHOD AND METHODOLOGY

METHOD AND METHODOLOGY

Research is a formal work undertaken systematically to increase the stock of knowledge, including knowledge of humanity, culture and society and use of this stock knowledge to devise new applications. Research is a step by step procedure. To reach at the destination various steps have to be followed. The initial stages are to set the title of research, second is to set objectives and third is material and methods which includes what types of parameters are used in research in order to reach the destination.

The present research, to study the relation between gait categories and varying height of people, was carried out to study the correlation between height of the person and different gait like step length. There are various methodologies involved in the past research to record gait pattern of the person in this research study to estimating the correct gait categories has an intuitive appeal.

To arrive such estimate, the methodology is part of the population of interest, one then divide into the two partitions by height category.

- 5 feet to 5 feet 6 inches
- 5 feet 6 inches to 6 feet

Objective of the study

- To record the systematic pattern of the people with varying height
- To analysis the correlation between different categories of person with same height

Randomization of samples:

For the estimate to have any relevance outside the experiment the sample must be randomly selected from the population of interest which is the student of Jharkhand Raksha Shakti University and some peoples from Ratu road.

Classification of sample:

It is essential that the sample to prepare the data for comparison.

Sampling conditions:

Sample acquires over the extended period of time, and over a similar conditions of all population thus, current sample are unbiased towards conditions in the single session using a single collection technique.

Sample size:

Correction rate drop with incredible in sample size, for example in the research of bhanu han and den_abdelkedar et. Al, it said that the larger the sample the more opportunities to make a mistake. So approximately 50 sample randomly selected in each height category of both male and female. The total sample is approximately is 200.

Data:

Research data is any information that has been collected, observed, generated or created to validate original research findings

Source of data:

1. Primary data will be collected by the simplest measurement system
2. Collection of data and measurement

Collection of data:

Scanning of the newspaper was done as per the parameters of the study and the data was collected on the daily basis. The first step included going thoroughly to the newspaper and identifying the stories, headlines, word count, lead, columns, pictures etc. on the basis of requirement of the research.

Procedure:

1. Very long wide sheet having dimension 3* 10 sheet spread over the surface
2. A subject walked on the sheet and left impression over it
3. The foot impression are marked
4. And gait features are measured by using measurement scale or tape, protector etc.
And it record book.

Selection of parameter

The parameter included:-

- Height of the person
- Step length
- Step width
- Foot angle
- Step angle

Analyses of data:

It is both qualitative and quantitative research study. Simple methods were adopted to establish the relation between variable which is height, step length, step width using a MS EXCEL software and percentage was calculated to find out frequency of foot angle and step angle in a given population of interest.

Table:

Information regarding parameters in all sample was put on the table and prepare observation table then all the analyses tabulated with the help of table to show brief result of research.

OBSERVATION

The gait pattern characteristics measurement is recorded in a tabular form for the better statistical analysis, which is given below and categorise by gender and height group. The tables are given below:\

CATEGORY (MALE) HEIGHT 5' TO 5'5"
CHARACTERISTICS

S.no	Height	SL	SW	SA	FA
1	159	52	3.75	25	10
2	158	54	3.5	20	12
3	161	52	3	26	12
4	160	50	3	20	10
5	162	56	2.5	30	15
6	162	55	2.5	30	15
7	160	52	2.5	20	10
8	157	48	4	20	10
9	160	54	3.5	25	16
10	156	45	5	20	10
11	162.5	55	4.5	25	15
12	160	52.5	3.5	25	15
13	162.5	55	3.5	30	16
14	160	50	5	25	10
15	162.5	55	3.75	25	12
16	160	50	2.5	20	10
17	160	47.5	5	25	12
18	162.5	45	4.5	20	10
19	157.5	50	4	20	10
20	162.5	55	2.5	30	16
21	162.5	60	3.5	25	12
22	160	52.5	2.5	20	10
23	160	50	3	25	12
24	156	45	5	20	10

25	160	50	3	20	10
26	162.5	55	5	25	15
27	158	54	3.75	20	12
28	162.5	56	3	30	14
29	160	50	2.5	20	10
30	163	58	3	25	12
31	163	40.5	11.5	15	10
32	158	56	3.5	20	12
33	160	50	3	20	10
34	162	54	2.5	25	14
35	156	48	4.2	20	14
36	162	53	2.5	25	12
37	161	54	2.75	20	10
38	162.5	60	3.5	25	12
39	160	54	2.5	20	10
40	157	49	3.75	25	14
41	162	55	2.5	30	16
42	164	59	4	30	14
43	160	50	2.5	20	10
44	159	54	2.5	20	12
45	162.5	52	2.4	20	10
46	161	48	3.75	20	12
47	163	58	2.75	25	14
48	160	50	3	20	10
49	162.5	45	4.5	20	10
50	160	53	3	25	12

TABLE NO 4.2

CATEGORY (FEMALE) HEIGHT 5' TO 5'5" INCH

S.no	Height	SL	SW	SA	FA
1	157.5	45	62.5	20	10
2	150	60	37.5	24	16
3	152.5	60	2.5	25	12
4	150	55	2.5	20	10
5	152.5	55	2.5	30	15
6	158	52	3.5	20	10
7	156	60	2.5	25	12
8	160	48	3	25	12
9	160	60	2.5	25	15
10	152	55	2.5	25	10
11	155	60	2.5	20	10
12	157.5	45	3.75	25	15
13	157.5	62	3.75	30	15
14	160	60	2.5	25	12
15	152.5	60	2.5	25	12
16	155	60	2.5	20	10
17	150	40	2.5	20	10
18	155	60	2.5	25	12
19	157.5	45	2.5	20	10
20	160	60	2.5	25	12
21	155	60	2.5	30	16
22	155	60	2.5	30	15
23	157.5	62.5	3.75	30	15
24	155	60	2.5	20	10
25	152.5	62.5	5	25	12
26	155	60	2.5	20	10
27	160	60	2.75	25	15

28	152	62	2.5	25	12
29	159	60	2.5	25	12
30	158	47	3.5	25	10
31	156	47	6.5	20	10
32	160	60	2.5	25	12
33	160	60	2.75	25	12
34	162.5	58	2.5	20	10
35	159	56	2	20	10
36	150	40	2.5	20	10
37	150	55	2.5	20	10
38	150	52	2.75	25	12
39	154	60	2.5	30	12
40	156	61	3.5	28	14
41	151.5	52	2	20	12
42	152	60	2.5	25	12
43	160	58	2.5	30	12
44	152.5	62.5	5	25	12
45	155	60	2.5	20	10
46	160	60	2.5	25	12
47	160	58	2	20	10
48	158	47	3	18	12
49	155	60	2.5	30	16
50	152	62.5	5	25	12

TABLE NO 4.3
CATEGORY (MALE) HEIGHT 5'6" TO 6' INCH
CHARACTERISTIC

S.no	Height	SL	SW	SA	FA
1	167.5	70	5	20	10
2	175	72.5	2.5	20	10
3	167.5	72.5	2.5	20	10
4	170	72.5	2.5	20	10
5	170	72.5	5	20	10
6	170	72.5	5	20	10
7	172	71	4.75	20	12
8	165	64	4	22	12
9	168	72	3.5	25	10
10	165	65	3.75	25	12
11	168	72	3.5	25	14
12	157.5	71	3.75	20	10
13	169	75	3.5	22	10
14	170	75	3.75	20	10
15	165	60	3.75	25	12
16	170	75	3.75	20	10
17	167.5	67.5	5	12	25
18	165	65	3.75	20	10
19	170	70	3.75	20	10
20	172.5	72.5	4.5	30	15
21	167.5	70	3.75	25	12
22	165	60	3.75	20	10
23	165	60	3.75	25	12
24	167.5	72.5	3.75	20	1010

25	165	65	4	20	10
26	170	75	3.75	20	15
27	172	70	4.5	25	12
28	166.5	72.5	2.5	25	15
29	168	70	3.8	25	15
30	171.5	72.5	4	30	10
31	168	75	3.5	20	10
32	170	72.5	7.5	20	10
33	167	70	5	20	10
34	171	75	5.5	25	10
35	170	75	3.75	20	10
36	170	70	3.75	20	10
37	168	67	3.2	25	10
38	168	67	5	20	12
39	168	70	3.8	26	12
40	168	72.5	3.75	25	12
41	168	70	5	20	10
42	170	72.5	5	20	12
43	170	70	3.75	20	10
44	172.5	72	3.75	24	15
45	175	72.5	2.5	20	10
46	175	72.5	2.5	20	10
47	168	70	3.75	25	12
48	170	72.5	2.5	20	10
49	170	74	4.8	25	10
50	172	72.5	4.5	30	15

CATEGORY FEMALE HEIGHT 5'6" TO 6"

	Height	SL	SW	SA	FA
1	165	65	5	20	10
2	170	75	5	30	15
3	165	65	3.75	20	10
4	167.5	70	2.5	20	10
5	165	65	2.5	25	10
6	167.5	70	5	25	10
7	164	64	4.5	30	15
8	167.5	67.5	2.5	20	10
9	165	60	3.75	20	10
10	170	75	5	30	15
11	165	65	5	20	10
12	168	67.5	2.75	25	15
13	172	75	4.75	28	15
14	166	64	3.5	25	12
15	164.5	65	5	20	10
16	165	67.5	3.75	20	10
17	165	65	3.75	30	15
18	167.5	72	2.5	15	10
19	165	65	5	20	10
20	167.5	70	2.5	20	10
21	165	65	5	20	10
22	167.5	65	2.5	20	10
23	167.5	67.5	2.5	25	10
24	165	60	3.75	20	10
25	165	62.5	5	25	10
26	165	65	5	20	10
27	164	60	5	20	15

28	165	62	5	25	10
29	165	68	3.5	20	10
30	170	73	5.5	30	15
31	165	66	3.5	20	10
32	165	65	3.75	20	10
33	167.5	68	2.5	25	12.5
34	170	75	5	30	15
35	170	75	5	30	15
36	167	66	2.5	20	10
37	168.5	70	5	25	12.5
38	168	68	5	25	10
39	168	68	5	25	10
40	171	72	5	30	15
41	170	75	5	30	15
42	167	67.5	2.5	25	12
43	167	72	2.5	15	10
44	170	75	5	30	15
45	170	75	5	30	15
46	164.5	67.5	3.75	20	10
47	168	69	3.5	20	10
48	168	69	3.5	20	10
49	170	72	5	28	15
50	169	65	2.5	25	10

STATISTICAL ANALYSIS:

The above data is statistically analyzed by MS EXCEL by applying the T test which is statistically hypothesized that two sample location test of the null hypothesis such that the mean of the two population area are equal. It should be only used if the variance of two populations is also assumed to be equal. The data used to carry out the test should be sampled independently from two populations being compared.

The t-test provides an exact test for the equality of means of two normal populations with unknown but equal variance.

HYPOTHESIS 1: Sex affects the step length of individual in the 5feet-5feet 5inches height range

NULL HYPOTHESIS: Sex does not affect the step length of individual in 5feet-5feet 5inches height range.

ALTERNATE HYPOTHESIS: Sex affects the step length of individuals in the 5feet-5feet 5 inches height range.

The mean or average of step length for males in the 5feet-5feet 5inches height range is 52.12.

The mean or average of step length for females in the 5feet-5feet 5inches height range is 56.50.

The standard deviation of step length for males in the 5feet-5feet 5inches height range is 4.12.

The standard deviation Of step length in female in the 5feet- 5feet 5 inches height range is 6.17.

The Variance of step length for males in the 5feet-5feet 5 inches height range is 17.04.

The Variance for step length for females in the 5feet-5feet 5 inches height range is 38.11.

The calculation and analysis of data shows that the p value is less than the standard significance level of 0.05. Thus the null hypothesis is rejected and alternate hypothesis is accepted.

The sample data supports that sex affects the step length in individuals in 5feet-5feet5 inches height range.

HYPOTHESIS 2: Sex affects the step length of individuals in the 5feet 5inches- 6feet height range.

NULL HYPOTHESIS: Sex does not affect the step length of individual in 5feet 5inches-6feet height range.

ALTERNATE HYPOTHESIS: Sex affects the step length of individuals in the 5feet 5inches-6feet height range.

The mean or average of step length for males in the 5 feet 5 inches-6 feet height range is 70.55.

The mean or average of step length for females in the 5feet 5inches-6 feet height range is 68.01.

The standard deviation of step length for males in the 5feet 5inches -6 feet height range is 3.84

The standard deviation of step length for females in the 5feet 5inches-6feet height range is 4.30
 The variance of step length for males in the 5feet 5 inches-6feet height range is 14.79
 The variance of step length for females in the 5feet 5 inches-6feet height range is 18.50.
 The calculation and analysis of data shows that the p-value is less than the standard significance level of 0.05.
 Thus, the null hypothesis is rejected and alternate hypothesis is accepted.

The sample data supports that sex affects the step length in individual in 5feet 5inches-6 feet height range.

HYPOTHESIS 3: Sex affects the step width of individuals in the 5feet-5feet 5inches height range.
 NULL HYPOTHESIS: Sex does not affect the step width of individuals in 5feet-5feet 5inches height range.
 ALTERNATE HYPOTHESIS: Sex affects the step width of individuals in 5feet-5feet 5 inches height range.

The mean or average of step width for males in the 5feet-5feet 5inches height range is 3.537.
 The mean or average of step width for females in the 5feet-5feet 5inches height range is 4.77.
 The standard deviation of step width for males in the 5feet-5feet 5 inches height range is 1.409.
 The standard deviation of step width for females in the 5feet-5feet5 inches height range is 9.70.
 The variance of step width for males in the 5feet-5feet 5inches height range is 1.98.
 The variance of step width for females in the 5feet-5feet 5inches height range is 94.106.
 The calculations and analysis of the data shows that the p-value is more than the standard significance level of 0.05. Thus, the null hypothesis is accepted and alternate hypothesis is rejected.

The sample data supports that sex does not affect the step width in individual in 5feet-5feet 5 inches height range

HYPOTHESIS 4: Sex affects the step width of individuals in the 5feet 5inches-6feet height range.
 NULL HYPOTHESIS: Sex does not affect the step width of individuals in the 5feet 5inches -6feet height range.
 ALTERNATE HYPOTHESIS: Sex affects the step width individuals in the 5 feet 5inches-6feet height range.
 The mean or average of step width for males in the 5feet 5inches-6feet height range is3.957.
 The mean or average of step width for females in the 5feet 5inches-6feet height range is 4.025.
 The standard deviation of step width for males in the 5feet 5inches-6feet height range is0.936
 The standard deviation of step width for males in the 5feet 5 inches-6feet height range is1.06
 The variance of step width for males in the 5feet 5 inches- 6feet height range is 0.876.
 The variance of step width for females in the 5 feet 5 inches- 6feet height range is 1.128.
 The calculation and analysis of the data shows that the p-value is more than the standard significance level of 0.05. Thus, the null hypothesis is accepted and alternate hypothesis is rejected.

The sample data supports that sex does not affect the step width in individuals in the 5feet 5inches-6feet height range.

HYPOTHESIS 5: Sex affects the step angle of individuals in the 5feet-5feet inches height range.
 NULL HYPOTHESIS: Sex does not affect the step angle of individuals in the 5feet-5feet 5inches height range.
 ALTERNATE HYPOTHESIS: Sex affects the step angle of individuals in the 5feet-5feet 5inches height range.

The mean or average of step angle for males in the 5feet-5feet 5inches height range is 23.12.
 The mean or average of step angle for females in the 5feet-5feet 5 inches height range is 24.
 The Standard deviation of step angle for males in the 5feet- 5fet 5 inches height range is 3.777.
 The standard deviation of step angle for females in the 5feet-5feet 5 inches height range is 3.59.
 The variance of step angle for males in the 5feet-5feet 5inches height range is 14.27.
 The variance of step angle for females 5feet-5feet 5inches height range is 12.93
 The calculation and analysis of data shows that the p-value is more than the standard significance level of 0.05. Thus, the null hypothesis is accepted and alternate hypothesis is rejected.

The sample data supports that sex does not affect the step angle in individuals in 5feet-5feet 5inches height range

HYPOTHESIS 6: Sex affects the step angle of individuals in the 5feet 5inches-6feet height range.

NULL HYPOTHESIS: Sex does not affect the step angle of individuals in the 5feet 5 inches-6feet height range

ALTERNATE HYPOTHESIS: Sex affects the step angle of individuals in the 5feet 5 inches-6feet height range.

The mean or average of step angle for males in the 5feet 5inches-6feet height range is 22.12

The mean or average of step angle for females in the 5feet 5inches-6feet height range is 23.62.

The standard deviation of step angle for females in the 5feet 5inches-6feet height range is 3.348

The standard deviation of step angle for females in the 5feet 5inches-6feet height range is 4.398

The variance of step angle for males in the 5feet 5inches-6feet height range is 11.209.

The variance of step angle for females in the 5feet 5inches-6feet height range is 19.342.

The calculation and analysis of data shows that the p-value is more than the standard significance level of 0.05. Thus, the null hypothesis is accepted and alternate hypothesis is rejected.

The sample data supports that sex does not affects the step angle in individuals in 5feet 5inches-6feet height range.

RESULT&DISCUSSION

To correlate persons gait characteristics with the gender in definite height category, gait pattern analysis are taken into considering. Even if new studies were able to show that a definite identification, like with fingerprinting, is impossible with gait pattern analysis it is still possible to exclude group of persons, for example through distinctive gait pattern features. This forensic approach presupposes that variable that have the potential to influence the gait patterns are known.

t-test has been applied for performing the correlation between sex and various gait characteristics, whether it is affected by sex of the persons or not. In the first type, two functions of data were taken. The function of data taken were step length of male and step length of female in 5ft to 5ft 5inches height category.

After calculation of the mean value of step length of height from 5ft to 5ft 5inches ranges, the value for the male and female are 52.12 and 56.50 respectively. The standard deviation of male from 5ft to 5ft 5inches height range is 4.1287444435, which is very low. Therefore, it shows that the mean value for the step length is more reliable and more accurate.

The variation of step length of male and female of 5ft to 5ft 5 inches height range is 17.04653061 and 38.1122449 respectively.

The calculated p value is 0.0000726896.

The calculation and analysis of the data shows that the p-value is less than the standard significance level of 0.05. thus, the null hypothesis is rejected and alternate hypothesis is accepted.

Therefore, the sample data supports that sex affects the step length in individuals in 5ft-5ft 5inches height to 6ft range.

SIMILARLY,

The another function of data taken were step length of male and step length of female in 5ft 5 inches to 6ft height category.

After calculation of mean value of step length of height from 5ft 5inches to 6ft range, the values for the male and female are 70.55cm and 68.01cm respectively. The standard deviation of male and female from 5ft 5inches to 6ft height range is 3.846877875 and 4.301743832. Therefor it shows that the mean value for step length is more accurate and reliable.

The variation of step length of male and female of 5ft 5nches to 6ft height range is 14.79846939 and 18.50 respectively.

The calculated p- value is 0.002441

The calculation and analysis of the data shows that the p-value is less than the standard significance level of 0.05. Thus, the null hypothesis is rejected and alternate hypothesis is accepted

The sample data shows that sex affects the step length in individuals in 5ft 5 inches to 6ft height range.

SIMILARLY

The another function of data were step width of male and step width of female in the 5ft to 5ft 5 inches height category

After calculation of mean value of step width of height from 5ft to 5ft 5 inches ranges, the value for the male and female are 3.537 and 4.77 cm respectively. The standard deviation of male and female from 5ft to 5ft 5 inches height range is 1.409291688 and 9.700862575 which is low. Therefore it shows that the mean value for the step width is reliable and more accurate.

The variation of step width of male and female in the 5ft to 5ft 5 inches height range is 1.986103061 and 94.10673469.

The calculated p- value is 0.377953

The calculation and analysis of the data shows that the p-value is more than the standard significance level of 0.05. Thus, the null hypothesis is accepted and alternate hypothesis is rejected.

The sample data supports that sex does not affect the step width in individuals in the 5ft to 5ft 5 inches height range.

SIMILARLY,

The another function of data were step width of male and step width of female with 5ft 5 inches to 6ft height range.

After calculation of the mean value of step width of height from 5ft 5 inches to 6ft height range, the value for the male and female are 3.957 and 4.025 respectively. The standard deviation of male and female of 5ft 5 inches to 6ft height range is 0.936287175 and 1.062162311 which is low. Therefore it shows that the mean value of step width is reliable and more accurate.

The variation of step width of male and female in the 5ft 5 inches to 6ft height range is 0.876633673 and 1.128188776.

The calculated p- value is 0.734903

The calculation and analysis of data shows that the p-value is more than the standard significance level of 0.05. Thus, the null hypothesis is accepted and alternate hypothesis is rejected.

The sample data supports that sex does not affect the step width in individuals in 5ft 5 inches to 6ft height range.

SIMILARLY,

The another function of data taken were step angle of male and step angle of female in 5ft to 5ft 5 inches height range.

After calculation of the mean value of step angle of male and female of height from 5ft to 5ft 5 inches ranges, the value for male and female are 23.12 and 24 respectively. The standard deviation of male and female from 5ft to 5ft 5 inches height range is 3.777700413 and 3.597050946.

The variance of male and female from height range 5ft to 5ft 5 inches height range is 14.27102041 and 12.92877551.

The calculated p- value is 0.655338.

The calculation and analysis of data shows that the p-value is more than the standard significance level of 0.05. Thus, the null hypothesis is accepted and alternate hypothesis is accepted.

The sample data supports that sex does not affect the step angle in individuals in the 5ft to 5ft 5 inches height range.

SIMILARLY,

The another function of data taken were step angle of male and step angle of female in 5ft 5 inches to 6ft height range .

After calculation of mean value of step angle of male and female of height 5ft 5 inches to 6ft, the value of male and female are 22.12 and 23.62 respectively. The standard deviation of male and female from height range 5ft 5 inches to 6ft are 3.348103331 and 4.398005114.

The variance of step angle of male and female of height range 5ft 5 inches to 6ft height range is 11.20979592 and 19.34244898.

The calculated p-value is 0.058112

The calculation and analysis of data shows that the p-value is more than the standard significance level of 0.05. Thus, the null hypothesis is accepted and alternate hypothesis is rejected.

The sample data supports that sex does not affect the step angle in individuals in the 5ft 5 inches to 6ft height range.

