ASSESSMENT OF THE EFFECTS OF CLIMATE CHANGE ON SOLAR RADIATION, RELATIVE HUMIDITY AND TEMPERATURE IN SOUTHEASTERN NIGERIA

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ABSTRACT
From generation to generation man has being faced by the menace of climate change due to the adverse effect it projects. Recently in Nigeria and the world at large beginning and ending of different seasons have become unpredictable and this is attributed to the effects of climate change. No day passes without commentaries on adverse effect of climate change globally and otherwise. Climate change is of two types namely; natural causes (bio-geographical) and the artificial causes (anthropogenic). They thus present unfriendly environmental hazard such as: erosion, drought, desertification, etc. It thus became necessary to carry out a thorough research on the phenomenon of climate change. In this research work, the effects of climate change due to relative humidity and temperature has been considered with reference to south-eastern Nigeria in order to deduce trends in relative humidity and temperature. The study has been carried out using meteorological data obtained from the Agro-meteorological unit of National Root Crops Research Institute (NRCRI) Umudike, Abia State, Nigeria.
Keywords: solar radiation, humidity, climate change, greenhouse emissions, anthropogenic

INTRODUCTION
Climate change has posed a stage of fright universally today due to its negative impacts on ecosystem and human societies in various ways ranging from rise in surface temperature of the earth, drought, famine, etc. Climate change is the change in the composition of the atmosphere that is over and above natural variations, attributed directly or indirectly to human activities. Furthermore, in recent usage, specifically from the view of environmental policy, climate change refers to the change in modern climate including global warming. Global warming refers to an overall increase in the temperature of the earth’s atmosphere. The implication here is that climate change is caused mainly by man and the situation is reversible if he starts working towards restoring and conserving the environment. Although global warming is likely to have impacts at all levels of the global society, these may be most detrimental in African nations, which traditionally have been vulnerable to existing climatic conditions. This is all the more concerning when one considers that Africa’s contribution to past and current greenhouse gas (GHG) emissions is insignificant in global terms.
This section of the paper presents a review of previous research works on climate change pointing out relevant contributions to the research theme and likewise showing their effects. These effects are discussed under:
   a. Impacts of climate change in sub-Saharan Africa
   b. Evidence of Climate Change in Nigeria
   c. Climate Change and Agriculture in Africa
   d. Impacts of Climate Change on Health
Impacts of climate change in Sub-Saharan Africa

African countries are particularly vulnerable to climate change due to their dependence on rain-fed agriculture, low levels of human and physical capital, poor infrastructure and high level of poverty. The adverse effects presented by climate change are vividly observed or pronounced in Sub-Saharan Africa, as the agriculture sector accounts for a large share of gross domestic product (GDP), export earnings and employment in most African countries. Furthermore, majority of the people reside in rural areas and depend on agriculture for their livelihood. International Food Policy Research Institute (IFPRI, 2009).

Irrigation water supply reliability, the ratio of water consumption to requirements, is expected to worsen in Sub-Saharan Africa due to climate change. Without climate change, calorie availability was expected to increase in Sub-Saharan Africa between year 2000 and 2050. With climate change; however, food availability in the region will average 500 calories less per person in 2050, a 21 percent decline International Food Policy Research Institute (IFPRI, 2009).

In a no-climate change scenario, only Sub-Saharan Africa (of the six regional groupings of developing countries studied in the report) sees an increase in the number of malnourished children between the year 2000 and 2050, from 33 to 42 million. Climate change will further increase this number by over 10 million, resulting in 52 million malnourished children in 2050. Additional investments to increase agricultural productivity can compensate for many of the adverse effects of climate change. Sub-Saharan Africa needs 40 percent of the estimated 7 billion US dollars per year in additional global agricultural investments, the majority of that for rural roads (International Food Policy Research Institute, 2009).

Evidence of climate change in Nigeria

The Nigeria Meteorological Society (NiMetS) in the year 2012 reported that flooding and erosion in the coastal regions and catchment areas close to rivers were inevitable. They further predicted abnormal rainfall results to flash flooding particularly in the northern parts of the country. This prediction of NiMetS is not only in line with the climatic change globally but has manifested in this part of Africa (Nigeria) and is still being expected (NiMetS, 2012).

Climate change and agriculture in Africa

Research on the impact of climate change suggests that agro-ecological systems are prone sector to negative climate effects. Agriculture in low latitude developing countries (e.g. Nigeria, Kenya, etc) is expected to be especially vulnerable because climates of many of these countries are already too hot. As increase in global warming occurs, there is high probability of reduction in crop productivity. These effects are exacerbated by the fact that agriculture and agro-ecological systems are especially prominent in the economies of African countries and the systems tend to be less capital and technology-intensive. Prediction shows that impact across regions consequently suggest large changes in the agricultural systems of low latitude (mostly developing) countries.

Health impact of climate change

Weather and climate play a significant role in people's health. Changes in climate affect the average weather conditions that we are accustomed to. Warmer average temperatures will likely lead to hotter days and more frequent and longer heat wave. This could increase the number of heat-related illnesses and deaths. Increases in the frequency or severity of extreme weather events such as storms could increase the risk of dangerous flooding, high winds, and other direct threats to people and property. Warmer temperatures could increase the concentrations of unhealthy air and water pollutants. Changes in temperature, precipitation patterns, and extreme events could enhance the spread of some diseases.

The impacts of climate change on health will depend on many factors. These factors include the effectiveness of a community's public health and safety systems to address or prepare for the risk and the behavior, age, gender, and economic status of individuals affected. Impacts will likely vary by region, the sensitivity of populations, the extent and length of exposure to climate change impacts, and society's ability to adapt to these changes.

Hence this study is aimed at assessing climate change in the study area using solar radiation, relative humidity and temperature in order to deduce changes in trend.
MATERIALS AND METHODS
Climatic parameters are of many components which include relative humidity, temperature, solar radiation, rainfall, wind speed, fog, thunder and hail.
This study shall be considering the assessment of climate change to solar radiation, relative humidity and temperature in this research work in order to deduce changes in trend. Hydrometer and thermometer were used in data acquisition.

Data collection of solar radiation and relative humidity
The data used in the study which include solar radiation and relative humidity were obtained from the Meteorological Unit of the National Root Crops Research Institute (NRCRI), Umudike, Abia State of Nigeria. The unit is responsible for the collection, analysis and storage of meteorological data in the institute. All data spanned for 30 years (1983-2013), which makes it suitable for the study since climate is atmospheric condition of a place for a long period of time. This institution has existed for a long time though it was named NRCRI in 1976 and has being a reliable source of primary meteorological data.
In this study, the meteorological data of solar radiation and relative humidity were analyzed using trend analysis method. In statistics, trend analysis often refers to techniques for extracting an underlying pattern of behavior in a time series which would otherwise be partly or nearly completely hidden by noise. Ordinary Least Square method (OLS) was used to determine the trend. The trend line equation is stated equation (1),
\[ \sum Y = \alpha + \beta t \quad \ldots \quad (1) \]
where \( \alpha \) = intercept and \( \beta \) = slope
Taking sum of both sides of equation (1) gives
\[ \sum Y = n\alpha + \beta \sum t \quad \ldots \quad (2) \]
Multiplying equation (1) by \( t \) and taking the sum of both sides, we have
\[ \sum tY = \alpha \sum t + \beta \sum t^2 \quad \ldots \quad (3) \]
Solving for \( \alpha \) (intercept) and \( \beta \) (slope) simultaneously, where \( \sum t = 0 \)
Then, \( \beta = \frac{n\sum tY - \sum t \times \sum Y}{\sum t^2} = \frac{(\sum t)^2}{\sum t^2} \)
and \( \alpha = Y - \beta t = \frac{\sum Y^2}{n} \)

Data Analysis
The data gotten from National Root Crops Research Institute (NRCRI) Umudike were used to plot the graphs in Figures 1 and 2 using Microsoft excel.

Figure 1: Relative humidity of Umudike from 1983-2013
Figure 2. Mean annual relative humidity (%) of Umudike from 1983-2013

Figure 1 shows that in November 2010 the relative humidity recorded was highest (97%). For the average annual relative humidity recorded in Figure 2, it is easy to see that Umudike has its highest value of annual relative humidity in 2006 (74.41%), while lowest in 1992 (64.66%). It also displays presence of trend as could be seen in the graph.

**Determining the trend of the relative humidity data over the years**

Estimation of trend line equation using Ordinary Least Square method

Trend equation: \( Y = \alpha + \beta t \) \hspace{1cm} (1)

Obtaining the normal equation for the trend equation

Taking sum of both sides of equation (1) and multiply \( \alpha \) by \( n \)

\[
\sum Y = n\alpha + \beta \sum t
\]  \hspace{1cm} (2)

where \( n \) is the number of years in consideration (\( n = 30 \))

Multiplying equation (1) by \( t \) and taking the sum of both sides

\[
\sum tY = \alpha \sum t + \beta \sum t^2
\]  \hspace{1cm} (3)

Solving for \( \alpha \) and \( \beta \) simultaneously

where \( \sum t = 0 \)

Then, \( \beta = \frac{n \sum tY - \sum t \sum Y}{n \sum t^2 - (\sum t)^2} = \frac{\sum tY}{\sum t^2} \)

and \( \alpha = \bar{Y} - \beta \bar{t} = \frac{\sum Y - \beta \sum t}{n} = \frac{\sum Y}{n} \)

**Computation:**

From Table 2

\[
\sum Y = 2217, \sum T = 0, \sum TY = 227.25,
\]
\[ \sum T^2 = 9920 \text{ and } n = 30 \]

Therefore, \[ \alpha = \frac{2217}{30} = 73.9 \]

and \[ \beta = \frac{227.25}{9920} = 0.0229 \]

Hence, the trend line equation is \( Y = 73.9 + 0.0229t \). That is to say, the trend line has an intercept as 73.9 and slope as 0.0229. This shows that on average the annual relative humidity of Umudike increases at the rate of 0.0229\%. Figure 4.6 shows the trend line associated with relative humidity data.

![Figure 3](image-url)

**Figure 3: Relative Humidity and trend line pattern in Umudike from 1983-2013**

**Testing the significance of the relative humidity trend line parameters**

The hypothesis to be tested is that

\( H_0: \alpha_0 = 0; \beta_0 = 0 \)

Decision rule: Reject the null hypothesis \( H_0 \) if \( t \) value calculated is greater than the \( t \) \( n - k \) degrees of freedom at 5\% level of significance. Otherwise, accept the null hypothesis.

The test statistics to test the significance is

\[ t = \frac{\alpha - \alpha_0}{s.e(\alpha)} \], for \( \alpha \) (intercept) in the trend line equation

And \[ t = \frac{\beta - \beta_0}{s.e(\beta)} \], for \( \beta \) (slope) in the trend line equation
Where, \( s.e (\alpha) \) is the standard error estimate of \( \alpha \) and equals \( \sqrt{\frac{\sigma^2}{n}} \), and \( s.e (\beta) \) is the standard estimate of \( \beta \) and equals \( \sqrt{\frac{\sigma^2}{\sum t^2}} \). Also, \( \sigma^2 \) is variance of the trend line residual and \( \sigma^2 = \frac{\sum u^2}{n-k} \) \( n \) = number of observation and \( k \) = number of parameters, (Gujarati, 2006).

Computation:

From Table 1, \( \sum t^2 = 9920 \), \( \sum u^2 = 151.141 \), \( n = 30 \) and \( k = 1 \)

\[
\sigma^2 = \frac{151.141}{30 - 1} = 5.2118
\]

\[
s.e (\alpha) = \sqrt{\frac{5.2118}{30}} = 0.4168
\]

\[
s.e (\beta) = \sqrt{\frac{5.2118}{9920}} = 0.0229
\]

Therefore, \( t \)-value for \( \alpha = \frac{73.9}{0.4168} = 177.30 \)

And, \( t \)-value for \( \beta = \frac{0.0229}{0.0229} = 1.00 \)

But, \( t \)-30 at 5% significant level is 2.042

At 5% level of significance, the value of the intercept \( \alpha \), is significant (\( t \) value = 177.30 greater than \( t \) tabulated = 2.042). Also the slope \( \beta \), is not significant (\( t \) value = 1.00 less than \( t \) tabulated = 2.042).

Temperature

Figures 4 and 5 show the plots of temperature and mean annual temperature of Umudike respectively for the period of thirty (30) years from 1983-2013.
Figure 4 shows that in March 1983, March 1989, and February 1997, the temperature recorded was highest (36°C).

Figure 5 shows that the highest average annual temperatures recorded in Umudike were in 1998 (27.6°C), 2000 (27.7°C) and 2010 (27.7°C) while the lowest was recorded in 2012 (26.2°C). It also displays presence of trend as could be seen in Figure 6.

**Determining the trend of the temperature data over the years**

Estimation of trend line equation using Ordinary Least Square method

Trend equation: \( Y = \alpha + \beta t \) \hspace{1cm} (1)

Obtaining the normal equation for the trend equation

Taking sum of both sides of equation (1) and multiply \( \alpha \) by \( n \)

\[ \sum Y = n\alpha + \beta \sum t \] \hspace{1cm} (2)
Where $n$ is the number of years in consideration ($n=30$)

Multiplying equation (1) by $t$ and taking the sum of both sides

$$\sum tY = \alpha \sum t + \beta \sum t^2$$

(3)

Solving for $\alpha$ and $\beta$ simultaneously

where $\sum t = 0$

Then, $\beta = \frac{n \sum tY - \sum t \sum Y}{n \sum t^2 - (\sum t)^2} = \frac{\sum tY}{\sum t^2}$

and $\alpha = \bar{Y} - \beta \bar{t} = \frac{\sum Y - \beta \sum t}{n} = \frac{\sum Y}{n}$

Computation:

From Table 2, it is observed that

$\sum Y = 836$, $\sum t = 0$, $\sum tY = 144.7$,

$\sum t^2 = 9920$ and $n = 30$

Therefore, $\alpha = \frac{836}{30} = 27.8667$

and, $\beta = \frac{144.7}{9920} = 0.0146$

Hence, the trend line equation is $Y = 27.8667 + 0.0146t$. That is to say, the trend line has an intercept as 27.8667 and slope as 0.0146. This indicates that on average the annual temperature of Umudike increases at the rate of 0.0146°C. Figure 6 shows the trend line associated with temperature data collected.

![Figure 6. Temperature and trend line pattern in Umudike from 1983-2013](image)
Testing the significance of the temperature trend line parameters

The hypothesis to be tested is that

\[ H_0: \alpha_0 = 0; \beta_0 = 0 \]

Decision rule: Reject the null hypothesis \( H_0 \) if \( t \) value calculated is greater than the \( t \) \( n - k \) degrees of freedom at \( 5\% \) level of significance. Otherwise, accept the null hypothesis.

The test statistic to test the significance is

\[ t = \frac{\alpha - \alpha_0}{s.e(\alpha)} \], for \( \alpha \) (intercept) in the trend line equation

And \( t = \frac{\beta - \beta_0}{s.e(\beta)} \), for \( \beta \) (slope) in the trend line equation

Where, \( s.e(\alpha) \) is the standard error estimate of \( \alpha \) and equals \( \sqrt{\frac{\sigma^2}{n}} \), and \( s.e(\beta) \) is the standard estimate of \( \beta \) and equals \( \sqrt{\frac{\sigma^2}{\sum i^2}} \). Also, \( \sigma^2 \) is variance of the trend line residual and \( \sigma^2 = \frac{\sum u^2}{n - k} \) \( n \) = number of observation and \( k \) = number of parameters, (Gujarati, 2006).

Computation:
From Table 4.3, \( \sum i^2 = 9920 \), \( \sum u^2 = 2.55174 \), \( n = 30 \) and \( k = 1 \)

\[ \sigma^2 = \frac{2.55174}{30 - 1} = 0.0879 \]

\[ s.e(\alpha) = \sqrt{\frac{0.0879}{30}} = 0.054 \]

\[ s.e(\beta) = \sqrt{\frac{0.0879}{9920}} = 0.00298 \]

Therefore, \( t \) -value for \( \alpha = \frac{27.8667}{0.0879} = 317.03 \)

And, \( t \) - value for \( \beta = \frac{0.0146}{0.00298} = 4.899 \)

But, \( t \) - 30 at \( 5\% \) significant level is 2.042

At \( 5\% \) level of significance, the value of the intercept \( \alpha \), is significant (\( t \) value = 317.03 greater than \( t \) tabulated = 2.042). Also the slope \( \beta \), is significant (\( t \) value = 4.899 greater than \( t \) tabulated = 2.042).

RESULTS AND DISCUSSION
From the result of the analysis, the total relative humidity of 25377.5% was observed in Umudike with mean relative humidity of 71.52%, the maximum monthly relative humidity observed was 97.0%. Also
the total temperature observed was 10030.45°C, the mean monthly temperature was 27°C and the maximum temperature was 36.0°C.

It is pertinent to note that within 1983-2013, Umudike observed the highest relative humidity in the year 1990 and the lowest in the year 1989 with mean annual relative humidity of 80.6% and 61.91%. The result obtained from the trend analysis shows that there is a slight increase of 0.0229% in annual relative humidity of Umudike. Also, the annual temperature of Umudike was at peak in the year 2010 (32.20°C), while the lowest annual temperature was recorded in the year 1989 (21.70°C), based on result obtained from the trend, it was observed that there is a slight increment (0.0146°C) in annual temperature of Umudike.

From the discussion above, it is clear to note that the effects of climate change, due to relative humidity and temperature in south-eastern Nigeria using Umudike as a case study was a success and the analysis has confirmed this. The annual relative humidity and temperature are on the increase.

Scientists have high confidence that global temperature will continue to rise for decades to come, largely due to greenhouse gases produced by human activities (IPCC 2007). The effects of this will bring about increased heat, drought and increase wildfire. These effects are detrimental to human existence. As stipulated by IPCC this research work is in line as seen in temperature increase.

**SUMMARY**
Climate change and global warming are pertinent global issues which have threatened mankind at present. Their occurrence is as a result of certain human activities which are unfriendly to the climate, though some schools of thought are of the opinion that there are certain other causes of climate change which are too complex and not fully understood. They have negative impacts on almost all aspects of life ranging from health, economies, education, agriculture, biodiversity and ecosystems. Since climate change affects life directly, necessity suggests it is given close attention. The study of effects of climate change due to solar radiation relative humidity and temperature in south-eastern Nigeria using Umudike, Abia State as a case study from the year 1983-2013 has been studied. It was observed that Abia state is experiencing an increase in annual relative humidity and temperature of the earth surface. Solar radiation generally is on the decrease at a rate of 0.01054 kWm⁻².

**RECOMMENDATIONS AND CONCLUSION**
Forestation should be encouraged, as eastern Nigeria is among the communities found in the agricultural map of Nigeria. Having said that, more attention should be paid to forestation which will not only be beneficial in the field of agriculture but also the environment as it will help in controlling erosion. Also preventive measure such as reduction in use of fossil fuel as source of energy should be taken into account. Burning of fossil fuel creates large amount of greenhouse gases, such as carbon-dioxide which is emitted into the atmosphere. When these gases are emitted, they change the composition of the atmosphere thereby making less heat escape and thus; cause the earth’s temperature to rise. They (GHGs) also perforate the ozone layer making the radiation from the sun effect on the earth adverse.

Another thing which should be considered is cutting down trees reduce the rate of evaporation of water to the atmosphere and increase in relative humidity which in turn brings less rain, therefore it is recommended that more trees are planted.

Having made some research on effects of climate change due to solar radiation, relative humidity and temperature, it is fully observed that so many adverse effects occur, and it is now left for all stakeholders to take preventive measure which involve partaking in environmental friendly activities such as planting of trees, rearing of less livestock, reduction in use of fossil fuels, bush burning, etc to abate the negative effects posed by climatic change. These actions by man will go a long way in helping to conserve and protect our environment and planet.
Table 1: Computation for estimation of relative humidity trend values of Umudike

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<th>T^2</th>
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Fig. 7 Hygrometer for measurement of relative humidity
(Source: http://upload.wikimedia.org/Wikipedia/commons/thumb/e/e9/Haar-Hygrometer)
Fig. 8 Thermometer
(Source: http://mt-st.erclipart.com/image/big/3b-1d-ec/thermometer)

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http://ete.cet.edu/gcc/?/volcanoes  
NASA EARTH OBSERVATORY:  
PART BASED VISUAL TRACKING FOR ISPF USING INDEPENDENCE TEST

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ABSTRACT
In this paper, a methodology has been proposed to find variations between the frames in visual tracking systems by part-based visual tracking which is optimistic and can overcome high computational cost. Over the decades, Multi-Variant analysis has become a well-known technique for statistical inference systems using multiple observations. All the earlier works, like Incremental Self-Tuning Particle Framework (ISPF), were particle based which classify the poses. In this study, a multi-variant analysis has been done on the particle based image frames to find the misplaced data in each frame. To estimate the part based parameters, least square estimation of maximum likelihood is applied. The experimental results are conducted on ANOVA test for part based frames.

Keywords: Incremental Self-Tuning Particle Framework, Multi-Variant Analysis, ANOVA, Least Square Estimation, and Part based Frames etc.

INTRODUCTION
Today, Visual Tracking is more important due to its wide applications in intelligent visual surveillance, human–computer interaction, augmented reality, driver assistance, robot vision, and so on. In any kind of field, to discover the suitable solution from available solutions, one should use optimization techniques [1]. Now to find the best suitable solution, mathematical optimization is a constraint based process is proposed. Video tracking is the process of locating a moving object or multiple objects over time using a camera. It has a variety of uses, some of which are: human–computer interaction, security and surveillance, video communication and compression, augmented reality, traffic control, medical imaging and video editing. Video tracking can be a time consuming process due to the amount of data that is contained in video. Adding further to the complexity is the possible need to use object recognition techniques for tracking, a challenging problem in its own right. The objective of video tracking is to associate target objects in consecutive video frames. The association can be especially difficult when the objects are moving fast relative to the frame rate. Another situation that increases the complexity of the problem is when the tracked object changes orientation over time. For these situations video tracking systems usually employ a motion model which describes how the image of the target might change for different possible motions of the object.

In traditional approach, particle filtering which relies only on random sampling for state optimization is used. The key idea of particle filtering is to represent the required posterior density function by a set of random samples with associated weights. Though particle filtering has a lower probability to be trapped in local maxima, the optimal importance function for sampling is often not available, so usually a very large number of particles (drawn from the prior dynamic model) are needed to approximate the posterior density. An ISPF framework is implemented for visual tracking on the affine group, which can find the optimal state in a chain like way with a very small number of particles proposed by Min Li [2][3]. ISPF uses an online-learned pose estimator[4][5] to guide random particles to move toward to their neighboring best states with the help of learned pose estimation, random particles become smart and sparse (thin).
sampling becomes possible. Particles can be incrementally drawn from a motion prior and then can be tuned iteratively toward the neighborhood of the optimal state by the pose estimation. The result is that a set of particles forms a short chain in the state space and efficiently finds the optimal state. Sampling is terminated if the maximum similarity of all tuned particles satisfies a target-patch similarity distribution modeled online or if the permitted maximum number of particles is reached. With the help of the learned PE and some appearance-similarity feedback scores, particles in ISPF [6] become “smart” and can automatically move toward the correct directions; thus, sparse sampling is possible. The optimal state can be efficiently found in a step-by-step way in which some particles serve as bridge nodes to help others to reach the optimal state. In addition to the single-target scenario, the “smart” particle idea is also extended into a multi-target tracking problem. This framework demonstrates that the ISPF can achieve great robustness and very high accuracy with only a very small number of particles.

**MULTIVARIATE NORMAL DISTRIBUTION**

Multivariate normal distribution is a probability distribution in a multivariate analysis. Multivariate normal distribution has a mean \( \mu \) and variance-covariance matrix \( \Sigma \) of random \( n \)-vector \( X \) and is denoted as \( X \sim N(\mu, \Sigma) \) and its density is given by equation—(1)

\[
f(x) = \frac{1}{(2\pi)^{n/2} |\Sigma|^{1/2}} \exp\left(-\frac{1}{2} (x - \mu)^\prime \Sigma^{-1} (x - \mu)\right)
\]

The following is the very special property of multivariate normal distribution, which is used to test the independency of the random variable.

**INDEPENDENCE TEST FOR POSES**

Let \( X \) is a normal random vector. The components are independent if they are uncorrelated. i.e., \( \text{Cov}(X_i, X_j) = 0 \) then they are uncorrelated so the two components \( X_i \) and \( X_j \) are independent [7].

In this paper we used this property in the following two cases:

**Case 1:** We have to compare all shapes of images and check whether all belong to one input image or not. In this case if they are not uncorrelated then all shape of images belongs to one particular image. i.e., \( \text{Cov}(X_i, X_j) \neq 0 \) and \( X_i, X_j \in C \) \( (X_i, X_j \) are from poses of images) which means they are not independent, which also implies that there is some relation between these poses. The example for covariance matrix has been shown in Figure 1.

**Case 2:** After succession of step 1, from all the angles of images we have to test which shape is the best match to the input images. In this case, we have to test the independency property for the input image and the shapes of images i.e., \( \text{Cov}(X_i, X_j) \neq 0 \). Here if we find any one of the shape is not independent to the input image, it is regarded as the target inference for the input image.

![Fig 1: illustration of motion tracking](image)

The transpose matrix are the homogeneous coordinates of pixels in object regions at Frame #0 and Frame #t, respectively; \( R_t \) is the transformation to be obtained by the tracking process.
PROPOSED ALGORITHM FOR PART BASED ISPF
1. Initially, Take the video file converts into Frame Set
2. Select the frame from frame set
3. Take difference between them using Bayesian filter estimates of the covariance and Correlated
4. If both image frame covariance and correlation is unbiased then
   Display “Both are same”
   Else
   Display “Not the Same”
End if
5. End

LEAST SQUARE ESTIMATION OF PART BASED IMAGES
Parameter estimation plays a center of attraction for software reliable approximation. This approach of reliable likelihood commonly contains two different ways as follows; one is to estimate the parameters that the input data is directly taken into equations. The other approach is fitting the curve described by the function to the data and estimating the parameters from the best fit to the curve. The most common method for this indirect parameter estimation is the least squares technique. In this, we estimate the value of one variable with the value of the other known variable. The statistical method which helps us to estimate the unknown value of one variable from the known value of the related variable is called regression [8][9]. The least squared data is as shown in Table 1 and Table 2. In this approach, there are two methods for studying regression namely, Graphic and Algebraic methods. In this section, we study the image recognition failure data sets using an algebraic method called as least square estimation. It indicates the best possible mean value of one variable corresponding to the mean value of the other. Here, we can compute the pose data set coefficients of the equation \( Y = a + bX \) by solving the normal equation. Regression equation of \( y \) on \( x \) is given is equations (2) and (3)
\[
\sum y = b \sum x + Na \quad \text{............ (2)}
\]
\[
\sum xy = b \sum x^2 + a \sum x \quad \text{............ (3)}
\]

PART BASED IMAGE DATA FOR LEAST SQUARE ESTIMATION
Table 1. Pose image data

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Table 2: Part based Image Data Least Square Estimation

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EXPERIMENTAL RESULTS
Analysis of Variance (ANOVA) is a hypothesis-testing technique used to test the equality of two or more population means by examining the variances of samples that are taken. ANOVA allows one to determine whether the differences between the samples are simply due to random error (sampling errors) or whether there is systematic treatment effects that cause the mean in one group to differ from the mean in another. The test images are shown in Figure 2 and Figure 3 respectively.

Fig. 2: Part based Pose oriented Frames

Fig. 3: Part based pose oriented image Frames

Solution: The null hypothesis for an ANOVA always assumes the population means are equal. Hence, we may write the null hypothesis as: the Null Hypothesis is $H_0$: All the means values of are not same. Since the null hypothesis assumes all the means are equal, we could reject the null hypothesis if only mean is not equal. Thus, the alternative hypothesis is: $H_1$: At least one mean pressure is statistically equal. Hypothesis $H_0$ at 1% level and conclude that the All the means values are same.

CONCLUSION
An incremental self-tuning particle filtering (ISPF) framework is implemented for pose tracking on the same person groups, which can find the optimal state in a chain like way with a very small number of part based particles. Before going to test the poses using Independent test conducted with the help of multivariate normal distribution is used. Finally, ANOVA test is conducted on part based pose estimation in same person frames.

REFERENCES