Age And Gender Prediction using Machine Learning

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Abstract: *The development of intelligent systems capable of effectively learning and recognising objects is the major goal of the very active research fields of pattern recognition and automatic classification. The usage of biometrics, which is generally utilised for security considerations, is integral to these applications. In the realm of research, the face modality has grown in importance as a basic biometric technique. The objective of this work is to create a system for estimating age and gender from a facial image or real-time video using convolutional neural networks. In this study, three CNN network models with various architectures (number of filters, number of convolution layers, etc.) were built and validated using data from the IMDB and WIKI. The results revealed that CNN networks significantly increase the system's performance and recognition accuracy.*

Keywords: CNN Networks, IMDB, WIKI, Biometric technique

1. Introduction

Gender and age are important factors in identifying someone. Since the emergence of social platforms and social media, automatic age and gender classification has been pertinent to a growing number of applications. Security problems can arise mostly from hiding these variables' true values. When it comes to image processing, a frame from a video or an image is used as the input, and after processing, the results are predicted predictions. Numerous algorithms and strategies have been employed for years as the processing mechanism. This article will provide an overview of important Machine Learning (ML)-based algorithms, methodologies for predicting age and gender, and how those relate to image processing.

Researchers have developed a number of algorithms using categorization and ML principles for predicting age and gender. Many secondary algorithms with improvements are derived from the most basic types of algorithms. The algorithms "Fisher faces" and "Eigen faces" are regarded as being simple. Deep Convolutional Neural Networks (CNN) are another tool at your disposal. The next paragraphs give a brief description of the algorithms.

The Eigenfaces method, which is based on Principal Component Analysis (PCA), identifies a linear combination of characteristics that optimises the overall variance in the data. While there is no doubt that this is an effective approach to describe data, since no classes are taken into account, a lot of discriminatory information may be lost when parts are removed. Imagine a scenario in which an outside source say let's the light is responsible for the variation in your data. The predicted samples are muddled together as a result of the PCA components' potential lack of discriminative information, making classification impossible.

2. Literature Survey

Golomb et al. employed the form shading (SFS) and multi layers perceptron (MLP) methods that Jing Wu et al. provided for gender classification. During this time, Khan et al. used classifier reinforcement, namely adaboost, for gender prediction. Yamaguchi et al. revealed that distinctions between the features of an adult's face and a child's include the length of the face and the ratio of each side among research on age prediction. Ueki and Coll also described a method of identifying age groups by linear discriminating analysis. Burt and Perrett researched the age estimation based on the usage of average faces of adults between 25 and 60 years of age. Although the SVM has been tested for age classification several times. Kwon and Lobo defined a method for classifying input images into one of three age groups: child, young and old using texture information. However, almost all previous research has been based on craniofacial development method and analysis of skin wrinkles.

During the last few years, a convolution neural network centered on deep learning, according to the powerful ability to estimate and extract features to enhance the precision of image classification, state-of-the-art achievements have been achieved in large areas.
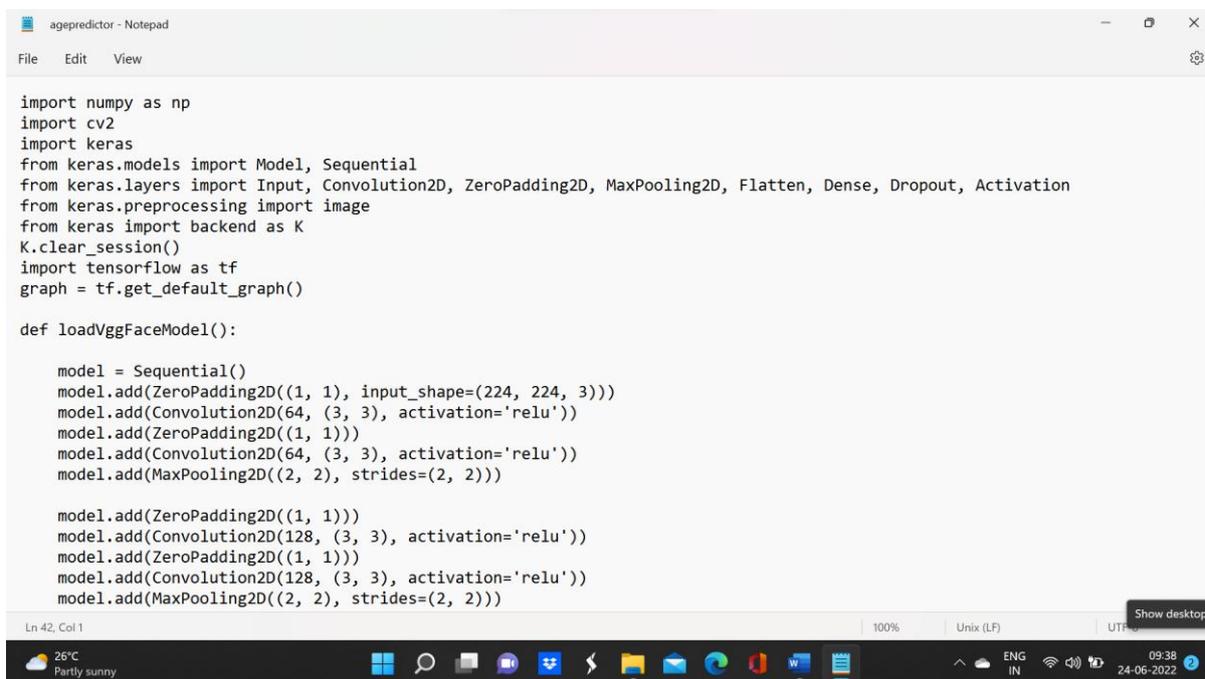
2.1 Existing System

Many techniques were applied for gender prediction from face images, Hui-Cheng Lian et al proposed gender recognition taking into account both form and texture information from facial images. This last is divided into small regions, from which local binary histograms are extracted and concated into a single vector representing the facial image, then the support vector machine (SVM) is applied for gender prediction

2.2 Proposed System

We will first introduce the basic structure of the convolutional neural network. Next, we will describe models CNN for training data to classify gender and age, then we will present the results obtained using a model trained by these data, and finally our conclusion.

Advantages:
- Learning of accurate pattern and insights from the provided data.(Depends on how well structured, clean or feature engineered the data is)
- One can tune the network to achieve better and accurate results.

- Can provide better outcomes than other machine learning algorithms if tuned better and feeded a good amount of data.

3. Sample Code

3.1 Purpose

This project's primary goal is to obtain In machine learning applications like access control, human-computer interaction, law enforcement, marketing intelligence, and visual surveillance, age and gender estimation from a single face image is a very crucial task. Age and gender are two key facial attributes that play a really foundational role in social interactions.

3.2 Scope

This document is the only one that describes the requirements of the system. It is meant for the use by the developers, and will also by the basis for validating the final deliver system. Any changes made to the requirements in the future will have to go through a formal change approval process. The developer is responsible for asking for clarifications, where necessary, and will not make any alternations without the permission of the client.

3.3 Implementation

Implementation includes all those activities that take place to convert from the old system to the new system. The old system consists of manual operations, which are operated in a very difficult manner from the proposed system. Proper implementation is essential to provide a reliable system to meet the requirements of the organization.

4. Result Analysis

The Hardware Requirements used in this paper are PC/Laptop, and RAM (minimum of 4GB). The Software Requirements used in this paper are Python Language, Jupyter Notebook (IDE) and the libraries used are Pandas, NumPy, learn, and matplotlib.
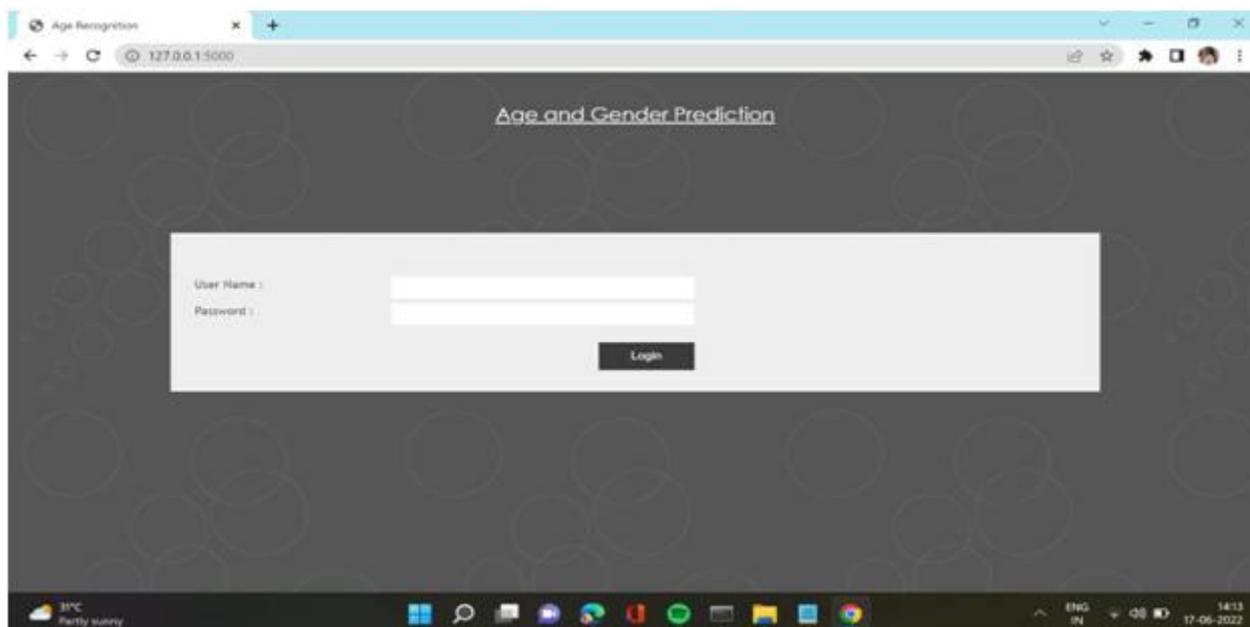
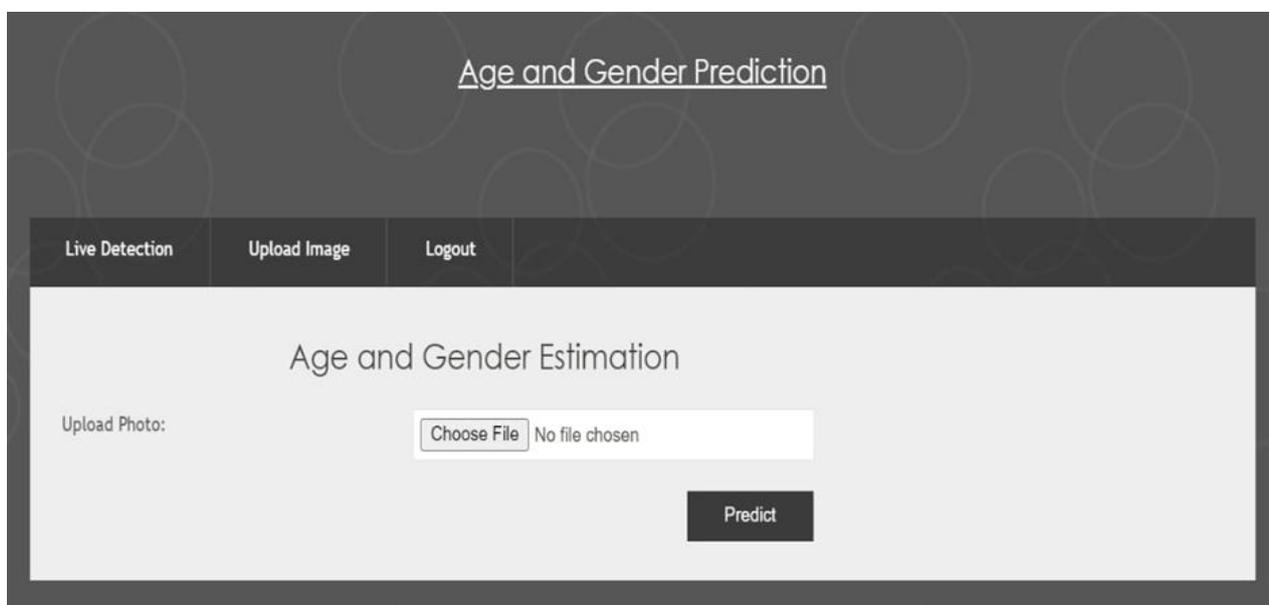**Figure:** login page of age and gender prediction
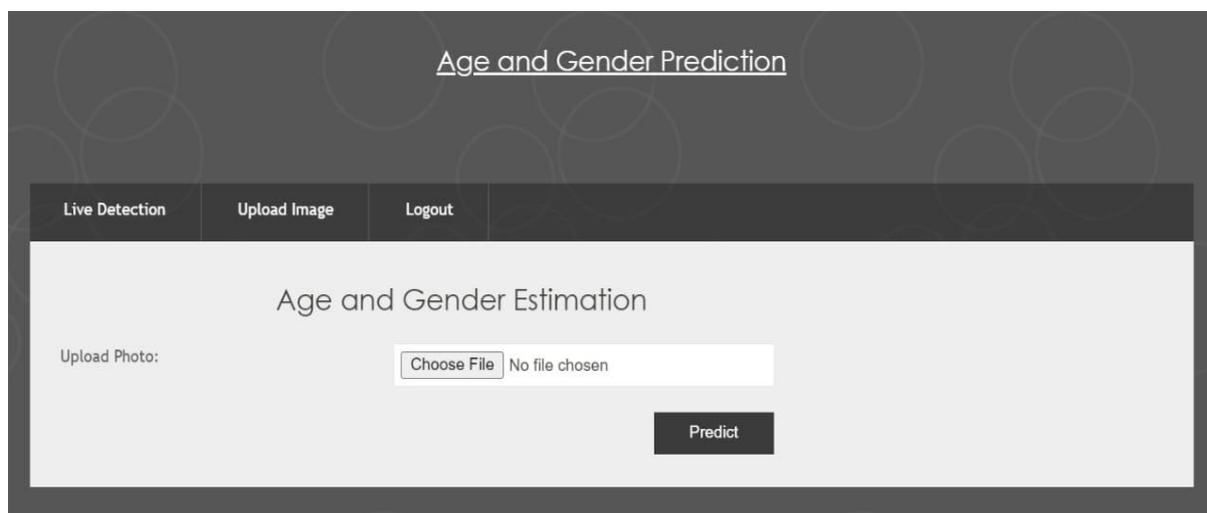

Figure 7.2: Home page for Age and gender prediction

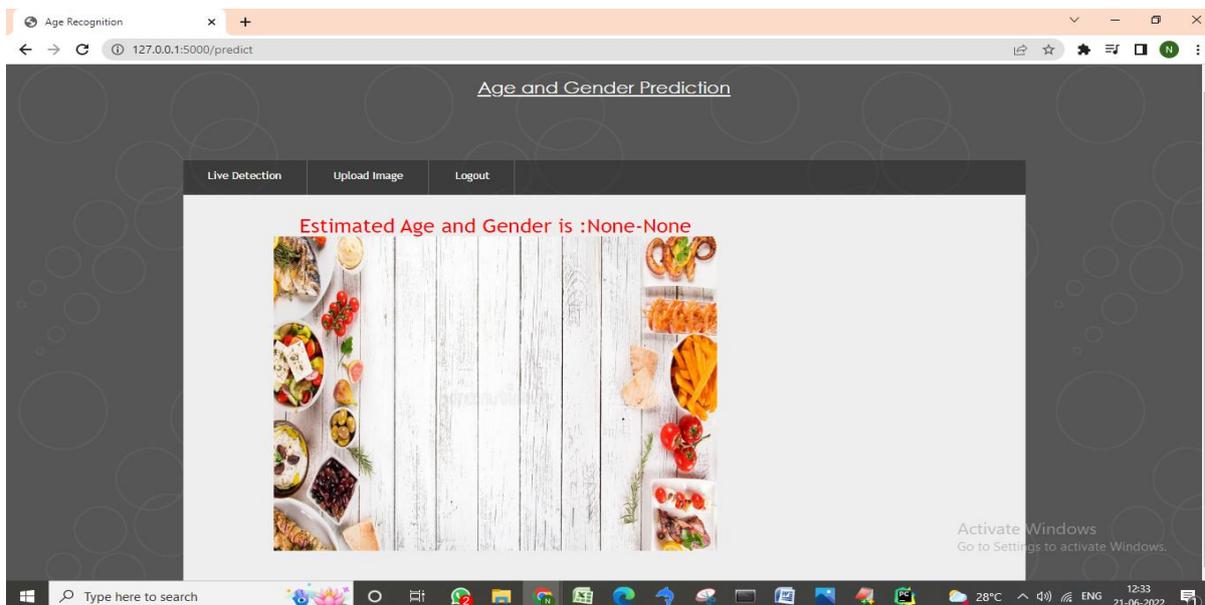**Figure 7.3:** Upload page for Age and gender prediction

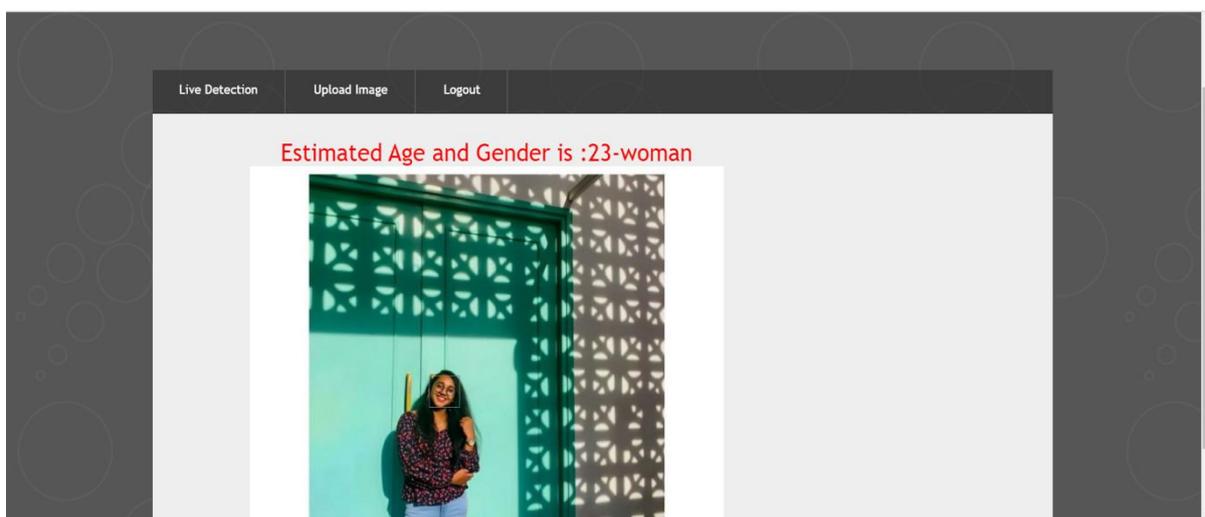**Figure 7.4:** Result1 for Age and gender prediction

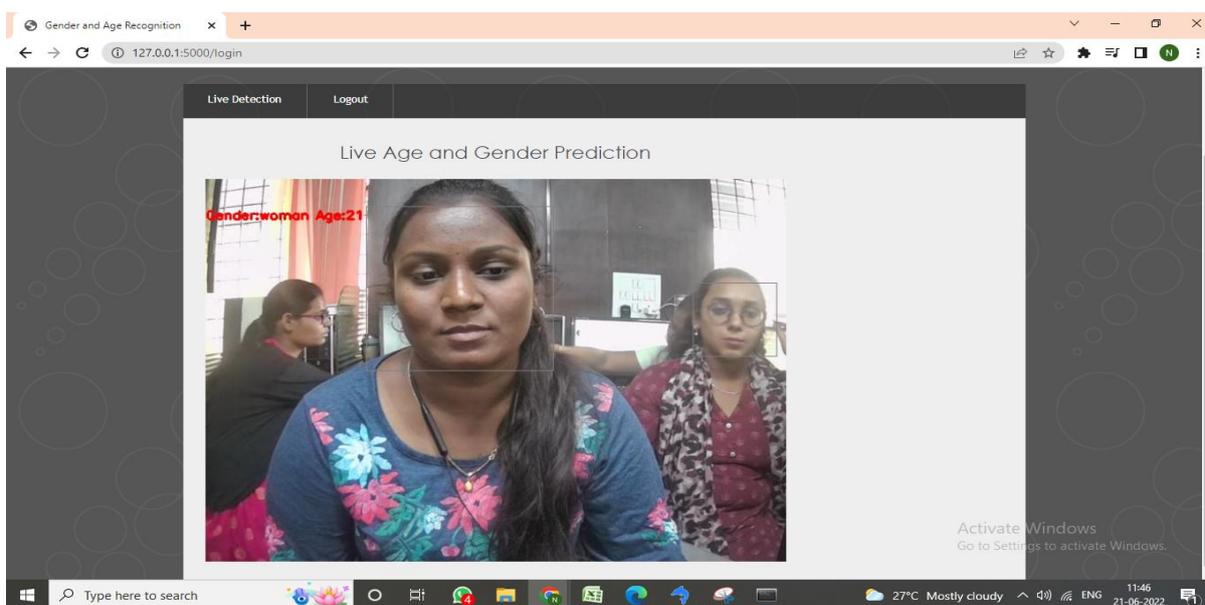**Figure 7.5:** Result2 for Age and gender prediction

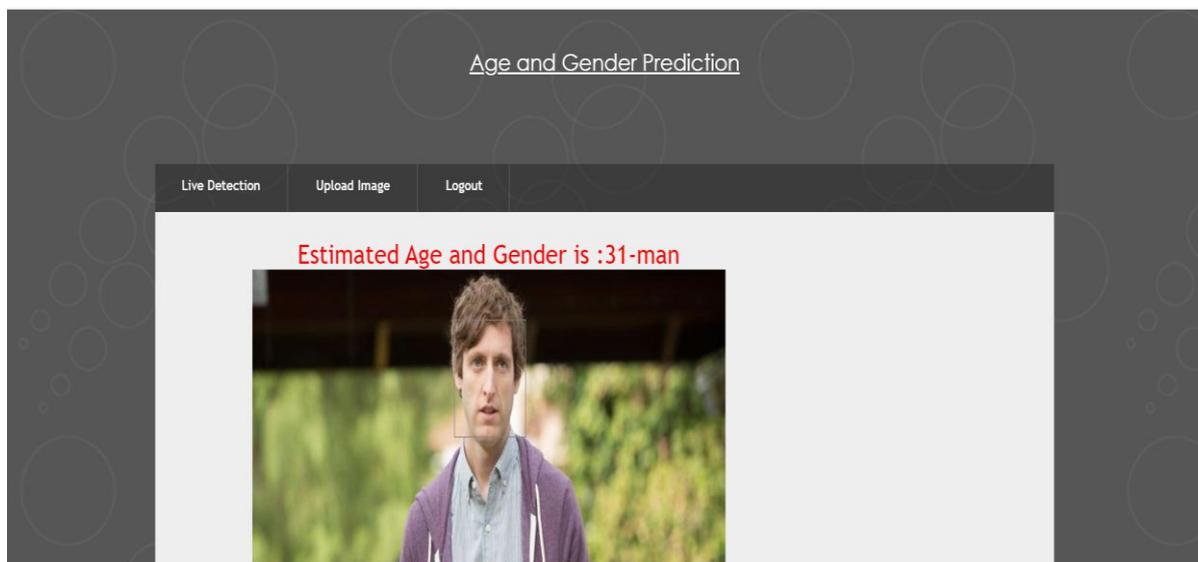**Figure 7.6:** Result3 for Age and gender prediction

Figure 7.7: Result4 for Age and gender prediction

5. Conclusion and Future Scope

5.1 Conclusion

In this article, we analyzed the implementation of deep convolutionnal neural network for human age and gender prediction using CNN. During this study various design was developed for this task, age and gender classification is one of the key segments of research in the biometric as social applications with the goal that the future forecast and the information disclosure about the particular individual should be possible adequately. In this study, the main conclusion that can be drawn is that age and gender from face recognition are very popular among research which can be used in social networks and advertising panels to implement an intelligent system that can achieve good and robust results in the accuracy of recognition, we employed a deep learning algorithm, as a convolutional neural network to propose a simple study contain various CNNs model in gender classification, trained in well-known datasets IMDB-WIKI, then we applied an efficient model for age estimation, the different results obtained in terms of precision, compared with those cited in the state of the art, have shown that the depth of the convolutional networks used in this work is an important factor in achieving better precision.

The creation of a face detection and recognition system using CNNs as a feature extractor and machine vector support as a classifier can be seen as an extension of our work. Another angle would be to test our method on different facial databases that exhibit significant differences in lighting and position.

5.2 Future Scope

- The proposed system is built around conventional three-tier architecture. The three-tier architecture for web development allows programmers to separate various aspects of the solution design into modules and work on them separately. That is, a developer who is best at one part of development, say UI development need not worry about the implementation levels so much. It also allows for easy maintenance and future enhancements.
- Any changes made to the requirements in the future will have to go through the formal change approval process.

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