HUMAN BEHAVIOUR RECOGNITION THROUGH AI

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Abstract: **From the last few decades Artificial Intelligence getting so famous because of its highly sophisticated features. Artificial Intelligence provides features such as computer vision, speech recognition, natural Language processing and many other features. Applications of AI are so promising that most of the companies are opting for this. Advance search engines, Recommendation Systems, Tracking System and almost everywhere AI takes its place. Main interest of this paper is to present STIP(spatio-temporal interest point) based methods for human behaviour recognition. These methods are distance and density based outlier methods, statistics and probabilistic methods, supervised and semi-supervised learning methods, pattern outlier detection methods. These methods are used to recognize human behaviour. Human behaviour recognition helps the government for maintaining rules and regulations such as traffic cameras, Face Mask detection and many other applications. During the time of covid, Face mask detection plays a crucial role in maintaining rule and also it helps to save people.**

Keywords: **Deep Learning, STIP, STC, STB**

I. INTRODUCTION

Artificial Intelligence was first introduced in 1956 by John Nathaniel Rochester, McCarthy, Marvin Minsky, and Claude Shannon. Main idea behind creating Artificial Intelligence is to mimic human intelligence and create something artificially that can do tasks that require complex logical and analytical thinking. However, Idea of Artificial Intelligence can be seen in 17th century when the idea of Automata was introduced by the great philosopher and mathematician Rene Descartes. Automata is a machine that can perform human-like actions.

There are several milestones of Artificial Intelligence but the first important milestone was seen in 1957 when perceptron was developed. It is basically a type of neural network. In recent years, exponential growth is seen in AI. Highly powerful applications such as Dall-E 2, ChatGPT, Stable Diffusion 2, Lumen5, Soundraw, Looka, Podcastle, Gen-1, Lalal.ai, Deep Nostalgia, Murf and many more. Artificial Intelligence based applications can do large and complex tasks within a few seconds that will take so much time when done by the human mind. Artificial Intelligence is so beneficial if developed and used wisely.

II. CONCEPT OF HUMAN BEHAVIOUR UNDERSTANDING

Human Behaviour Recognition through AI involves analyzing and interpreting human movements, gestures, actions and activities. It understands patterns from various data sources such as sensor data, videos and many other sources.Human Behaviour Recognition has a wide range of applications in many fields such as monitoring, tracking, smart medicine, and sport assistance

III. STEPS OF HUMAN BEHAVIOUR RECOGNITION THREOUGH AI

Following are some important steps for Human Behaviour Recognition:
* Data Collection
* Data Preprocessing
* Feature Extraction
* Modeling and Training
* Behaviour Recognition

IV. DEEP LERNING & ITS ROLE IN HUMAN RECOGNITION

Deep Learning is a subfield of Artificial Intelligence and Machine Learning. Deep learning is used for training artificial neural networks for making intelligent andlogical decisions[1].
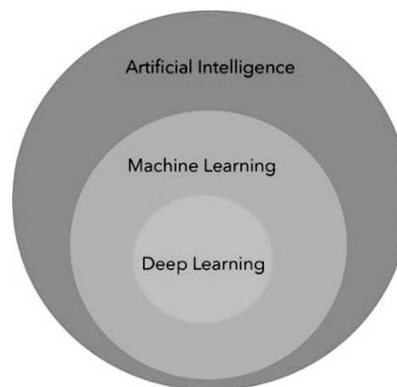

Figure1: MLVs DL

Role of deep learning in the Human Recognition system is crucial. Deep learning helps to extract information from data sources such as Video or sensor information and analyse it to present information about human behaviour such as action, gesture, activities, human movements.

Useful Python Libraries[4]
Following are some important python libraries:
- OpenCV
- MediaPipe
- Face Emotion Recognizer(FER)
- Pandas
- NumPy

IV. STIP DETECTION ALGORITHM IN VIDEO
STIP detection algorithm in Video is used to find points with different contrast and significant change in temporal and special dimensions. This helps to identify human behaviour and other relevant features.

Following Algorithms are used for STIP detection in videos. These algorithms are [4]
- Harris 3D
- Scale-Invariant Feature Transform
- Optical flow methods
- Difference-of-Gaussians(DoG)
- Speeded-Up Robust Features
- Dense Trajectories

STC (Spatio-temporal corners)
Spatio-temporal corners are the points in a video sequence that show a sufficient amount of changes in both time and space[2]. These points are different from normal spatial changes but spatio-temporal corners are based on both space and time. These corners help to track behaviour in videos and present the result. Different algorithms are used in spatio-temporal corner detection.
Few algorithms are:
- Extensions of the Harris corner detector
- The Shi-Tomasi corner detector
- FAST corner Detector

STB (Spatio-temporal blobs)
Spatio-temporal blobs are important for video processing and computer vision tasks. STB [3]refers to regions of video sequence where both spatial and temporal changes occur. Spatio-temporal blobs help in tracking objects, analysing motion and understanding the video.
Few algorithms are:
- Background Subtraction
- Optical Flow
- Temporal Difference
- 3D Convolutional Network

VII. CONCLUSION & FUTURE SCOPE
Artificial Intelligence and its features are so powerful and beneficial. Large number of jobs are created with the development of AI such as AI Research Scientist, Data Scientist and many more. Future scope of this technology is so high as most of the Multinational companies are working on this technology.

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