Review-1

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Research Area/Topic/problem

The chosen research area is Video Processing over realtime video input feed for an effective virtual Field of View (FOV) of the subject without physically moving the camera.

- The Region of interest (ROI) is determined from the detection algorithms based on media objects like faces, edges etc.
- The second phase comes with masking 2D coordinates onto the computer image for extracting details like Moving direction, subject count and design correct actuators for the designated action.
- Finding the boundaries, Choosing a good crop-ratio for a sweet spot between field-of-view and pixel density based on artefacts like eyes, edges, colour and etc.
- The solution prototype should fix issues with fixed webcam angle and should compensate with physical movement of people virtually with crop-factor, zoom and distortions tweaks.

This solution can be integrated into Webcams and even DSLR’s for better conversations during video conferences, white-board teaching etc.

Literature survey- paper 1

Video object detection with a convolutional regression tracker.

- We have created an object tracker for the video object detection task, which can be easily inserted into a well trained image object detector. Without harming the performance of an object detector, the tracking functionality can be implanted into the model.

- Our tracker is light-weighted, memory efficient, and computationally efficient, as it re-uses the features from an object detector. Our tracker is compatible with the deep features extracted for the object detection purpose.

- Our new tracker performs in adaptive scales according to the sizes of different objects being tracked, which could cope with large object
size variation in a video.

- We have designed a new video object detection pipeline to combine the advantages from both object detection and object tracking. With
better bounding box proposals and linkages through time, we improve the performance with better effectiveness and efficiency.

Cons:

- The detector finds new objects, while the tracker follows the objects and provides better boxes for linking and re-scoring. Without re-scoring, the detection results could be incorrect or weak.

Literature survey- paper 2

Deep neural networks for low cost eye-tracking.

- Improves the targeting capability of the system in detecting living subjects by scanning for eyes over the view of the camera.
- The effective region of interest(ROI) is minimised to just the eye, thus reducing sustained higher order computing required for longer
intervals.
- The gaze detection improves the prediction of the movements in the frame by accounting for the inertia of the subject for better tracking, greatly reducing the miss ratio in certain times.

Cons:

- The eye-tracking can be disturbed at times when direct Infrared light source hits the frame making detection of eye harder.
- The field of view has to produce a rectangular output in defined ratios such as 16:9 or 3:2 with possible amount of reduction in anomalies in video such as distortion, focus miss etc.

Literature survey- paper 3

Three-step action search networks with deep Q-learning for real-time object tracking.

- Provides an efficient and acceptably accurate method that is real-time to meet our demands of cropping into video in real-time.
- Works considerably faster than existing algorithms at a loss of acceptable accuracy.

Cons:

- The algorithm even though the best available at the moment does require significant computational power to run in real-time.
- The usage of CNN must be researched further and its implementations must be looked into.

Literature survey- paper 4

Eye tracking algorithms, techniques, tools, and applications with an emphasis on machine learning and Internet of Things technologies.

The advantages of eye tracking and the change it made in the modern world
- Giving a brief overview about the different kind of eye tracking techniques
- How can ML be an important part in eye tracking.

Cons:

- The techniques which were good but were complex in structure.
- The usage of ML is highlighted but no examples were shown

Literature survey- paper 5

Realtime in-plane displacements tracking of the precision positioning stage based on computer micro-vision.

Pros:

- The methods to calculate the displacement of the objects were accurate.
- The implementation of AIOS algorithm with OTC and PU scheme.
- The validation examples of the experiments performed.

Cons:

- No works are mentioned about the extension of this method to space multi-DOF movement measurement.

References

Video object detection with a convolutional regression tracker. https://doi.org/10.1016/j.isprsjprs.2021.04.004

Deep neural networks for low cost eye-tracking. https://doi.org/10.1016/j.procs.2020.09.041

Three-step action search networks with deep Q-learning for real-time object tracking https://doi.org/10.1016/j.patcog.2019.107188

Eye tracking algorithms, techniques, tools, and applications with an emphasis on machine learning and Internet of Things technologies https://doi.org/10.1016/j.eswa.2020.114037

Realtime in-plane displacements tracking of the precision positioning stage based on computer micro-vision https://doi.org/10.1016/j.ymssp.2019.01.046