Paper Repository

<https://arxiv.org/pdf/2101.11563> - Detecting Deepfake videos using Euler Magnification

2021

One approach to determine deepfakes is via psychological signs such as blinking, as there aren’t many pictures of celebrities with eyes shut , therefore this isn’t well synthesised in fakes. Objective of the paper is to sense a heartrate from deepfake videos, these are assumed to have no heartbeat as they are an image layered over a real video (not stable not under perfect lighting conditions)

EVM based colour and movement amplification is performed on videos to determine if a difference can be seen between deepfakes and real videos. They use EVM to spot small movements such as a natural tremor that is naked to the human ate but is frequent with a small amplitude. Graph in paper shows that tremor is symmetrically distributed and therefore can be magnified by EVM and may be used as a detector between real and fake videos.

Technique used is SSIM which compares two frames and evaluates their likeness calculating a similarity index for the video based on visual structures

However, Euler motion was seen to introduce noise as the amplification factor increases.

No definitive conclusion to this paper, stating there is more work to be done.

<https://ieeexplore.ieee.org/abstract/document/9194790> - Face liveness detection using Eulerian video magnification and SIFT Algorithm

2020

Not the easiest paper to read. Figures show a subtle change in real peoples faces after Eulerian magnification, whereas there is no change in ‘fake’ persons face after the same process.

Methodology used was applying a spatial decomposition by Laplacian pyramid, then extracting frequency bands of interest with bandpass filter and amplifying resulting signal, using Yu (original) code

Results conclude that we can distinguish ‘fake’ faces from real faces within one second, however future work needs to further improve the classification accuracy.

<https://www.sciencedirect.com/science/article/pii/S1746809423010418> - Remote photoplethysmography for heart rate measurement: A review.

2024

Talks about the utilisation of remote photoplethysmography for remote heart rate measurement, which removes the need for skin-to-skin contact.

Comprehensive review papers in this area apparently seem to be scarce. This paper is an overview of all different rrpg methods sued for heart rate monitoring.

<https://openaccess.thecvf.com/content_cvpr_2013/papers/Balakrishnan_Detecting_Pulse_from_2013_CVPR_paper.pdf> - Detecting Pulse from Head Motions in Video

2013

This paper tracks features on the head and decomposes their trajectories into a set of component motions. The component that best corresponds to heartbeats compared to the temporal frequency spectrum is then chosen. The motion projected to this component is analysed and the peaks of the trajectories are identified, these therefore correspond to heartbeats.

When the paper tested this process on 18 subjects, their approach reported heart rates nearly identical to an electrocardiogram.

Extracting heartrate without contact is beneficial for populations such as premature neonates and the elderly whom their skin is susceptible to damage from traditional sensors.

The subtle changes in the length of heartbeats are also able to be determined, with association to the health of automatic nervous systems.

Authors believe combination of colour an motion EVM methods would prove more effective than either one independently.

Head motion detection outperformed colour for 7 of the 17 subjects and performed worse for 9 (Remaining 1 was an anomaly altogether)

<https://dl.acm.org/doi/abs/10.1145/3394171.3413707> - Exposing Deepfakes with Attentional Visual Heartbeat Rhythms.

2020

This paper preposes ‘DeepRhythm’ a Deep Fake detection rechnique. They use the small motions of blood flow changing face colour to detect differences between deepfakes and real faces. They used FaceForensics++ and DFDC preview datasets to test their proposed technique. It was confirmed that normal heartbeat rhythms that can be seen in real faces were disrupted in deepfake videos. This showed the effectiveness of DeepRhythm and how it can generalise over different data sets with various deepfake generation techniques.

<https://www.sciencedirect.com/science/article/abs/pii/S088832702400579X> - Motion magnification for video-based vibration measurement of civil structures: A review

2024

This paper comprehensively reviews the motion magnification (MM) technique for the video-based vibration measurement of civil structures. The review will provide guidance to researchers and engineers in selecting suitable MM methods for vibration measurement of civil structures.

A diagram of a computer

AI-generated content may be incorrect.

I just like that picture.

One of the papers reviewed Lu et al ([Observation of tower vibration based on subtle motion magnification - ScienceDirect](https://www.sciencedirect.com/science/article/pii/S2405896319323420?via%3Dihub)) showed that they successfully used LMM algorithm to detect the fatigue damage of a tower.

The Motion magnification result of structures was found to be easily affected by motion amplitude. When the amplitude of small motion is close to the amplitude of noise the magnified video is greatly affected by noise and the image quality is poor. To better apply the MM to systems producing SHM in practical engineering, the efficiency of existing computational MM methods needs to be improved urgently according to this review. This review states it is necessary to develop an efficient MM algorithm suitable for real time monitoring of civil structures.

<https://www.sciencedirect.com/science/article/abs/pii/S0957417423006371> - Video-based real-time monitoring for heart rate and respiration rate

2023

This paper explores monitoring heart rate in real time using Eulerian Video Magnification.

They used the following Pseudo code:

-Read video frames

-Apply EVM

-Apply MediaPipe Pose Detection

- Detecting the left shoulder and nose landmarks in each frame

-Compute distance between left shoulder and nose

-Append these values to a data list

-Apply Bandpass filter to output data list

-Estimate peaks to determine respiration rate

-End

Second algorithm is just the usual colour magnification to determine pulse.

NEED TO FINISH

<https://ieeexplore.ieee.org/abstract/document/7851001>

**Towards Reading Hidden Emotions: A Comparative Study of Spontaneous Micro-Expression Spotting and Recognition Methods**

In this sub-experiment, we focus on motion magnification. We show that Eulerian motion magnification can improve ME recognition performance.

<https://link.springer.com/article/10.1007/s10489-022-03766-z>

**Deepfakes generation and detection: state-of-the-art, open challenges, countermeasures, and way forward**

<https://www.researchgate.net/profile/Zaid-Jabbar-Al-Allaq/publication/339080048_Eulerian_video_magnification_a_review/links/5e3c6d8ba6fdccd9658e07fb/Eulerian-video-magnification-a-review.pdf>

Eulerian video magnification: a review