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Review on Small Motion Amplification for Medical Analysis and Secret Information Retrieval

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Abstract —We will probably uncover worldly varieties in recordings that are troublesome or difficult to see with the bare eye and show them in a characteristic way. Our strategy, which we call Eulerian Video Magnification, takes a standard video grouping as info, and applies spatial deterioration, trailed by fleeting separating to the casings. The subsequent flag is then intensified to uncover concealed data. Utilizing our technique, we can imagine the stream of blood as it fills the face and furthermore to intensify and uncover little movements. Our method can keep running progressively to demonstrate wonders happening at transient frequencies chose by the client.

Keywords- Video-Based Rendering, Spatio-Temporal Analysis, Eulerian Motion, Motion Magnification

I. INTRODUCTION

The human visual framework has constrained spatio-transient affectability, however numerous signs that fall beneath this limit can be useful. For instance, human skin shading shifts somewhat with blood flow. This variety, while undetectable to the exposed eye, can be misused to extricate beat rate. In a consistently maturing society, taking administer to elderly assumes a noteworthy part. In the most recent years, a few specialized help frameworks have been created to help elderly individuals in their day by day exercises and to call help in the event of crises. These works demonstrate that it is conceivable to recognize a fall in the home condition and educate relatives or parental figures. In any case, these frameworks just act after the crisis happened. The objective of our undertaking is to distinguish a man's present wellbeing status and act pre-emptively if there should arise an occurrence of signs for conceivable crises. So far, current associate frameworks are not ready to play out this. They are not ready to choose whether a man is dozing in an easy chair or has endured a circulatory crumple and are oblivious.
A high advantage of this technique is its contact-less working mode. This technique ended up being extremely advantageous for patients, since they don't need to wear any gadgets. In that way, impacts, for example, skin aggravations and distress can be maintained a strategic distance from. Estimating the heart rate permits the discovery of bradycardia and tachycardia at a beginning time, with the goal that crises can be kept away from. Correspondingly, movement with low spatial adequacy, while hard or outlandish for people to see, can be amplified to uncover fascinating mechanical conduct. Visual movement can happen at various amplitudes, and over various worldly and spatial recurrence scales. Little movements are hard to watch, yet may uncover vital data about the world.

II. LITERATURE REVIEW

Peter J. Burt, And Edward H. Adelson "The Laplacian Pyramid As A Compact Image Code" IEEE Transaction On Communications, Vol. Com-31, NO. 4, APRIL 1983.

We describe a technique for image encoding in which local operators of many scales but identical shape serve as the basis functions. The representation differs from established techniques in that the code elements are localized in spatial frequency as well as in space. Pixel-to-pixel correlations are first removed by subtracting a lowpass filtered copy of the image from the image itself. The result is a net data compression since the difference, or error, image has low variance and entropy, and the low-pass filtered image may represented at reduced sample density. Further data compression is achieved by quantizing the difference image. These steps are then repeated to compress the low-pass image. Iteration of the process at appropriately expanded scales generates a pyramid data structure. The encoding process is equivalent to sampling the image with Laplacian operators of many scales. Thus, the code tends to enhance salient image features. A further advantage of the present code is that it is well suited for many image analysis tasks as well as for image compression. Fast algorithms are described for coding and decoding.
The Laplacian pyramid is a versatile data structure with many attractive features for image processing. It represents an image as a series of quasi-bandpassed images, each sampled at successively sparser densities. The resulting code

elements, which form a self-similar structure, are localized in both space and spatial frequency. By appropriately choosing the parameters of the encoding and quantizing scheme, one can substantially reduce the entropy in the representation, and simultaneously stay within the distortion limits imposed by the sensitivity of the human visual system. Summarizes the steps in Laplacian pyramid coding. The first step, shown on the far left, is bottom-up construction of the Gaussian pyramid images g0 , g1 , …, gN. The Laplacian pyramid images L0, L1, …, LN are then obtained as the difference between successive Gaussian levels. These are quantized to yield the compressed code represented by the pyramid of values Cl(ij). Finally, image reconstruction follows an expand-and sum procedure using C values in the place of L values. Here we designate the reconstructed image by r0. It should also be observed that the Laplacian pyramid encoding scheme requires relatively simple computations.
The computations are local and may be performed in parallel, and the same computations are iterated to build each pyramid level from its predecessors. We may envision performing Laplacian coding and decoding in real time using array processors and a pipeline architecture. An additional benefit, previously noted, is that in computing the Laplacian pyramid, one automatically has access to quasi-bandpass copies of the image. In this representation, image features of various sizes are enhanced and are directly available for various image processing and pattern recognition tasks.

Christian Wiede, Julia Richter, Andre Apitzsch, Fajer KhairAldin and Gangolf Hirtz “Remote Heart Rate Determination in RGB Data An Investigation using Independent Component Analysis and Adaptive Filtering” ISBN: 978-989-758-173-1 Copyright c 2016 by SCITEPRESS – Science and Technology Publications, Lda. All rights reserved.

An emerging topic in the field of elderly care is the determination and tracking of vital parameters, such as the heart rate. This parameter provides important information about a person’s current health status. Within the last years, various researches focused on this topic. The recognition of vital parameters is increasingly relevant for our ageing society. This paper presents a method to remotely determine the human heart rate with a camera. At this point, we suggest to use independent component analysis (ICA) and adaptive filtering for a robust detection. In our processing chain, we used different image processing techniques, e. g. face detection, and signal processing techniques, e. g. FFT and band pass filtering, in this study. An evaluation with several probands, illuminations, frame rates and different heart rate levels showed that we could achieve a mean error of 4.36 BPM, which corresponds to CAND of 94.45 %, and a speed of 35 fps. In this paper, we presented a method for remote heart rate determination using ICA and adaptive filtering. With regard to applications in domestic environments and for elderly care, the obtained results are adequate. For other use cases, especially in clinical environments, where highly accurate measurements are required, accuracy has to be improved. For future work, the algorithm should also be robust against motion artefacts. One solution could be a feature tracking on the forehead region. By porting the algorithm to an embedded system, a more flexible and praxis-oriented solution could be achieved. With the help of such a system, it could be possible to pre-emptively detect emergencies in domestic environments.

Ming-Zher Poh, Daniel J. McDuff, and Rosalind W. Picard “Advancements in Noncontact, Multiparameter Physiological Measurements Using a Webcam” IEEE Transactions On Biomedical Engineering, Vol. 58, No. 1, January 2011.

We present a simple, low-cost method for measuring multiple physiological parameters using a basic webcam. By applying independent component analysis on the color channels in video recordings, we extracted the blood volume pulse from the facial regions. Heart rate (HR), respiratory rate, and HR variability (HRV, an index for cardiac autonomic activity) were subsequently quantified and compared to corresponding measurements using Food and Drug Administration-approved sensors. High degrees of agreement were achieved between the measurements across all physiological parameters. This technology has significant potential for advancing personal health care and telemedicine.

Ming-Zher Poh, Nicholas C. Swenson, and Rosalind W. Picard “A Wearable Sensor for Unobtrusive, Long-Term Assessment of Electrodermal Activity” IEEE Transactions On Biomedical Engineering, Vol. 57, No. 5, May 2010

Electrodermal activity (EDA) is a sensitive index of sympathetic nervous system activity. Due to the lack of sensors that can be worn comfortably during normal daily activity and over extensive periods of time, research in this area is limited to laboratory settings or artificial clinical environments. We developed a novel, unobtrusive, nonstigmatizing, wrist-worn integrated sensor, and present, for the very first time, a demonstration of longterm, continuous assessment of EDA outside of a laboratory setting. We evaluated the performance of our device against a Food and Drug Administration (FDA) approved system for the measurement of EDA during physical, cognitive, as well as emotional stressors at both palmar and distal forearm sites, and found high correlations across all the tests. We also evaluated the choice of electrode material by comparing conductive fabric with Ag/AgCl electrodes and discuss the limitations found. An important result presented in this paper is evidence that the distal forearm is a viable alternative to the traditional palmar sites for EDA measurements. Our device offers the unprecedented ability to perform comfortable, long-term, and in situ assessment of EDA. This paper opens up opportunities for future investigations that were previously not feasible, and could have far-reaching implications for diagnosis and understanding of psychological or neurological conditions.

We have presented a compact and low-cost wearable EDA sensor that enables comfortable long-term assessment of EDA. The novelty of our system consists of the use of the dorsal forearms as recording sites, the miniaturization of the sensor module, as well as the design of a small wristband that allows for unobtrusive and nonstigmatizing continuous EDA measurements during everyday activities. Experimental outcomes using Ag/AgCl electrodes correlated strongly with the FDA-approved EDA measurement system. To the best of our knowledge, we described the first detailed study indicating that the ventral side of the distal forearms is a viable alternative to the more popular palmar sites for EDA measurements across physical, cognitive, and emotional stressors. Importantly, we also presented the first long-term recordings of EDA during daily activity outside of a laboratory or clinical setting. While palmar electrodes are encumbering, easily lost, and frequently subjected to motion and pressure artifacts, the proposed wrist-worn sensor does not suffer anywhere near as much from these problems. Given the versatility of the proposed system that acts both as a data forwarding and data logging device, users are not constrained to stay within the range of a base station, but, instead, have unrestricted continuous measurements regardless of location. The importance of this paper is the unprecedented ability to perform comfortable long-term and in situ assessment of EDA that the proposed system offers. Long-term continuous EDA measurements during normal daily activity like that in Fig. 9 have, to the best of our knowledge, not prior to this paper been demonstrated in a practical way, and thus, the new technology developed in this paper represents a significant advancement over existing systems. Investigations of long-term sympathetic nervous system activity can potentially add precious insight and enrich understanding of widespread neurological conditions. Studies are currently underway to evaluate the use of the proposed EDA sensor in a variety of clinical applications, including autism, epilepsy, and sleep disorders.

Hao-Yu Wu, Michael Rubinstei, Eugene Shih, John Guttag, Fredo Durand, William Freeman “Eulerian Video Magnification for Revealing Subtle Changes in the World”

Our goal is to reveal temporal variations in videos that are difficult or impossible to see with the naked eye and display them in an indicative manner. Our method, which we call Eulerian Video Magnification, takes a standard video sequence as input, and applies spatial decomposition, followed by temporal filtering to the frames. The resulting signal is then amplified to reveal hidden information. Using our method, we are able to visualize the flow of blood as it fills the face and also to amplify and reveal small motions. Our technique can run in real time to show phenomena occurring at temporal frequencies selected by the user.
We described a straightforward method that takes a video as input and exaggerates subtle color changes and imperceptible motions. To amplify motion, our method does not perform feature tracking or optical flow computation, but merely magnifies temporal color changes using spatio-temporal processing. This Eulerianbased method, which temporally processes pixels in a fixed spatial region, successfully reveals informative signals and amplifies small motions in real-world videos.

Ce Liu Antonio, Torralba William, T. Freeman Fredo, Durand Edward, H. Adelson “Motion Magnification” Computer Science and Artificial Intelligence Lab (CSAIL) Massachusetts Institute of Technology.

We present motion magnification, a technique that acts like a microscope for visual motion. It can amplify subtle motions in a video sequence, allowing for visualization of deformations that would otherwise be invisible. To achieve motion magnification, we need to accurately measure visual motions, and group the pixels to be modified. After an initial image registration step, we measure motion by a robust analysis of feature point trajectories, and segment pixels based on similarity of position, color, and motion. A novel measure of motion similarity groups even very small motions according to correlation over time, which often relates to physical cause. An outlier mask marks observations not explained by our layered motion model, and those pixels are simply reproduced on the output from the original registered observations. The motion of any selected layer may be magnified by a userspecified amount; texture synthesis fills-in unseen “holes” revealed by the amplified motions. The resulting motion-magnified images can reveal or emphasize small motions in the original sequence, as we demonstrate with deformations in load-bearing structures, subtle motions or balancing corrections of people, and “rigid” structures bending under hand pressure.
We have presented a new technique, motion magnification that reveals motions that would otherwise be invisible or very difficult to see. The input is a sequence of images from a stationary camera. The system automatically segments a reference frame into regions of “common fate”, grouped by proximity, similar color, and correlated motions. Analogous to focussing a microscope, the user identifies the segment to modify, and specifies the motion magnification factor. The video sequence is then re-rendered with the motions of the selected layer magnified as desired. The output sequence allows the user to see the form and characteristics of the magnified motions in an intuitive display, as if the physical movements themselves had been magnified, then recorded.

III. IMPLEMENTATION OF PROPOSED METHODOLOGY

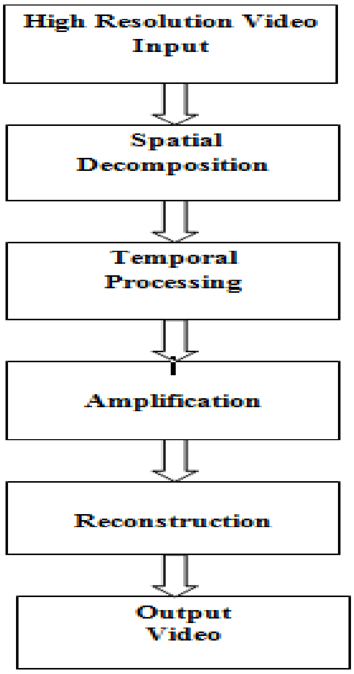

Fig. 1 Flow Chart of the Eulerian Video Magnification

We initially break down the video grouping into various spatial recurrence groups. These groups may be amplified diversely in light of the fact that they may show distinctive flag to-commotion proportions or they may contain spatial frequencies for which the straight guess utilized as a part of our movement amplification does not hold. In the last case, we decrease the enhancement for these groups to smother curios. At the point when the objective of spatial preparing is basically to build fleeting sign to-clamor proportion by pooling different pixels, we spatially low-pass channel the casings of the video and downsample them for computational productivity. In the general case, in any case, we register a full Laplacian pyramid. We at that point perform fleeting preparing on each spatial band. We consider the time arrangement relating to the estimation of a pixel in a recurrence band and apply a band pass channel to separate the recurrence groups of intrigue. For instance, we may choose frequencies inside 0.4-4Hz, relating to 24-240 beats for every moment, on the off chance that we wish to amplify a heartbeat. In the event that we can extricate the beat rate, we can utilize a tight band around that esteem. The transient handling is uniform for every single spatial level, and for all pixels inside each level. We then duplicate the separated band passed motion by an amplification factor. This factor can be determined by the client, and might be lessened naturally. We add the amplified flag to the first and crumple the spatial pyramid to get the last yield. Since normal recordings are spatially and transiently smooth, and since our sifting is performed consistently finished the pixels, our technique verifiably keeps up spatiotemporal coherency of the outcomes.

IV. CONCLUSION

We portrayed a clear strategy that takes a video as info and overstates unobtrusive shading changes and indistinct movements. To increase movement, our technique does not perform include following or optical stream calculation, but rather simply amplifies worldly shading changes utilizing spatio-transient preparing. This strategy, which will transiently forms pixels in a settled spatial locale, effectively uncovers educational flags and intensifies little movements in true recordings.

REFERENCES

[1] Peter J. Burt, And Edward H. Adelson “The Laplacian Pyramid As A Compact Image Code” IEEE Transaction On Communications, Vol. Com-31, NO. 4, APRIL 1983.

[2] Christian Wiede, Julia Richter, Andre Apitzsch, Fajer KhairAldin and Gangolf Hirtz “Remote Heart Rate Determination in RGB Data An Investigation using Independent Component Analysis and Adaptive Filtering” ISBN: 978-989-758-173-1 Copyright c 2016 by SCITEPRESS – Science and Technology Publications, Lda. All rights reserved.

[3] Ming-Zher Poh, Daniel J. McDuff, and Rosalind W. Picard "Advancements in Noncontact, Multiparameter Physiological Measurements Using a Webcam" IEEE Transactions On Biomedical Engineering, Vol. 58, No. 1, January 2011.

[4] Ming-Zher Poh, Nicholas C. Swenson, and Rosalind W. Picard"A Wearable Sensor for Unobtrusive, Long-Term Assessment of Electrodermal Activity" IEEE Transactions On Biomedical Engineering, Vol. 57, No. 5, May 2010

[5] Hao-Yu Wu, Michael Rubinstein, Eugene Shih, John Guttag, Fredo Durand, William Freeman "Eulerian Video Magnification for Revealing Subtle Changes in the World"

[6] Ce Liu Antonio, Torralba William, T. Freeman Fredo, Durand Edward, H. Adelson "Motion Magnification" Computer Science and Artificial Intelligence Lab (CSAIL) Massachusetts Institute of Technology.

[7] FREEMAN, W. T., ADELSON, E. H., AND HEEGER, D. J. 1991. Motion without movement. ACM Comp. Graph. 25, 27–30.

[8] FUCHS, M., CHEN, T., WANG, O., RASKAR, R., SEIDEL, H.-P., AND LENSCH, H. P. 2010. Real-time temporal shaping of high speed video streams. Computers & Graphics 34, 5, 575–584.

[9] HORN, B., AND SCHUNCK, B. 1981. Determining optical flow. Artificial intelligence 17, 1-3, 185–203.

[10] LIU, C., FREEMAN, W., SZELISKI, R., AND KANG, S. B. 2006. Noise estimation from a single image. In IEEE CVPR, vol. 1, 901 – 908.

[11] LUCAS, B. D., AND KANADE, T. 1981. An iterative image registration technique with an application to stereo vision. In Proceedings of IJCAI, 674–679.

[12] PHILIPS, 2011. Philips Vitals Signs Camera. http://www. vitalsignscamera.com.

[13] POH, M.-Z., MCDUFF, D. J., AND PICARD, R. W. 2010. Non-contact, automated cardiac pulse measurements using video imaging and blind source separation. Opt. Express 18, 10, 10762–10774.

[14] VERKRUYSSE, W., SVAASAND, L. O., AND NELSON, J. S. 2008. Remote plethysmographic imaging using ambient light. Opt. Express 16, 26, 21434–21445.

[15] WANG, J., DRUCKER, S. M., AGRAWALA, M., AND COHEN, M. F. 2006. The cartoon animation filter. ACM Trans. Graph. 25, 1169–1173.