

**Fact sheet**

**Explainable Computer Vision Workshop**

and

**Job Candidate Screening Coopetition**

**Pyramid Multi-Level Features for Apparent Personality Analysis through Facial Videos**

9 February 2017

**1. Team details**

1.1 Team name: PML

1.2 Team leader name: Salah Eddine Bekhouche

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1.4 Rest of the team members: Fadi Dornaika, Abdelkrim Ouafi and Abdelmalik Taleb-Ahmed

1.5 Team website URL (if any): <http://salah.bekhouche.com/challenges/FirstImpressionsV2.html>

1.6 Affiliation: Department of Electrical Engineering, University of Biskra, Algeria

**2. Contribution details**

2.1 Title of the contribution: Pyramid Multi-Level Features for Apparent Personality Analysis through Facial Videos

2.2 Final score: Not available

2.3 General method description:

* Overview of the proposed approach

The proposed approach can be divided into three phases: face preprocessing, feature extraction and personality traits estimation.

**Face preprocessing phase:**

For each frame, we detect the face and its landmarks to obtain the eyes center which used to align the face. Off-the shelf face detector is used. The eyes are detected using the recent face point detectors [2]. Then the aligned face is resized to 224x244.

**Feature extraction phase:**

We apply two different texture descriptors: Local Phase Quantization (LPQ) and Binarized Statistical Image Features (BSIF) the results of the two descriptors will be represented by a Pyramid Multi-Level (PML). The features extracted from both PML-BSIF and PML-LPQ are concatenated in one vector. Each video frame has its own vector, for the final feature vector, associated with the whole video, we compute the mean of all feature vectors. In PML representation, the original image is explicitly transformed and represented by several scaled images. Their number is equal to the number of levels. For each such an image, a specific grid is used to obtain a multi-block representation of the corresponding image [1].

**Personality traits estimation phase:**

The proposed method first obtains the score for every main trait, then the five estimated scores will be used for estimating the interview score. Therefore, for scoring the personality traits we feed the PML features to five nonlinear Support Vector Regressors (SVRs) each SVR is for one of the big five personality traits. These SVRs will estimate the 5 scores which are considered as new features for the interview trait. We feed these features to the Gaussian Process Regression (GPR). Thus, we estimate interview score from the GPR based on the estimated five scores. The GPR was tuned to find the hyperparameters.

* The proposed method uses / takes advantage of personality traits?

Yes

* Coopetition: can your code be shared among other participants for the second stage of the challenge? Yes
* Total method complexity: (see Table in 5.3)
* Which pre-trained or external methods/models have been used (for any stage, if any): Off-the shelf face detector was used, BSIF filters were used.
* Which additional data has been used in addition to the provided ChaLearn training and validation data (at any stage, if any): No additional data has been used
* Qualitative advantages of the proposed solution: The proposed approach can be implemented easily. It also offers the possibility of using other texture descriptors. Furthermore, the proposed approach uses the results of the big five traits to estimate the interview score which means it can naturally use and integrates the other competitive teams’ approaches.

Furthermore, the proposed method can quantify and compute the relation between the real scores of the five traits and that of the interview score.

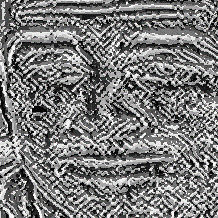
* Results of the comparison to other approaches (if any): NA
* Novelty degree of the solution and if it has been previously published: NA

2.4 GitHub URL for the project: <https://github.com/Bekhouche/FirstImpressionsV2>

2.5 References:

1. SE Bekhouche, A Ouafi, F Dornaika, ATaleb-Ahmed and A Hadid, “Pyramid Multi-Level Features for Facial Demographic Estimation”, In press.
2. Kazemi, V., & Sullivan, J. (2014). One millisecond face alignment with an ensemble of regression trees. In Proceedings of the IEEE Conference on Computer Vision and Pattern Recognition (pp. 1867-1874).

2.6 Representative image / diagram of the method:



interview

agreeableness

conscientiousness

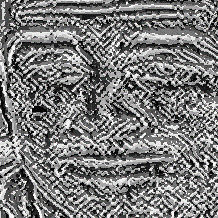
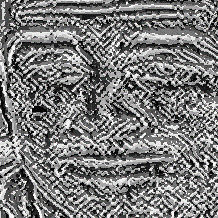
extraversion

neuroticism

openness

GPR estimation

New features



PML-BSIF-LPQ features

SVRs estimation

Face normalization

Feature extraction

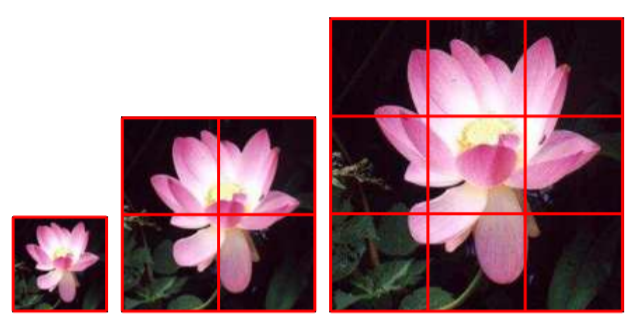
2.7 Describe data preprocessing techniques applied

We skipped the frames where Viola-Jones algorithm did not find any face. The final features vector, associated with a video, is the mean of the all used frames features.

**3 Personality Trait recognition from Visual data**

3.1 Features / Data representation

As we said above, we use PML representation (see figure below) on the BSIF and LPQ images to obtain features of different scales and different parts.



3.2 Dimensionality reduction

None

3.3 Model

None

3.4 Learning strategy

We trained 5 SVRs, each SVR represents one trait of the Big Five personality traits. The estimated scores of the 5 SVRs considered as a vector of 5 features. We feed these features to GPR estimator to get the interview score.

3.5 Other techniques

None

3.6 Method complexity

For all phases (face preprocessing, feature extraction and personality traits estimation), it takes a day and few hours.

**4 Multimodal Personality Trait recognition**

4.1 Data Fusion Strategies

As described above, we combine the scores of the big five traits to become features for the interview score.

**5 Other details**

5.1 Language and implementation details (including platform, memory, parallelization requirements):

OS: Ubuntu 16.04

CPU: Intel Xeon Processor E3-1535M v5 ,8M Cache, 2.90 GHz

RAM: 64GB

Language: Python2.7 and Matlab R2016b

Libraries: OpenCV and Dlib

5.2 Human effort required for implementation, training and validation?:

2 days (implementation)

5.3 Training/testing expended time?:

|  |  |  |  |
| --- | --- | --- | --- |
|  | Interview | Big Five traits | All |
| Train | 13 minutes | 1 hour 36 minutes | 1 hours 49 minutes |
| Test | Less than one minute | 29 minutes | 30 minutes |
| Total | 14 minutes | 2 hours 5 minutes | **2 hours 29 minutes** |

5.4 General comments and impressions of the challenge? what do you expect from a new challenge in face and looking at people analysis?

Thanks to the organizers for this opportunity. We hope that there will be another competition about “invite-for-interview” and we suggest that for the videos to be in uncontrolled conditions and different qualities.

**6 References**

1. SE Bekhouche, A Ouafi, F Dornaika,ATaleb-Ahmed and A Hadid, “Pyramid Multi-Level Features for Facial Demographic Estimation”, In press.
2. Kazemi, V., & Sullivan, J. (2014). One millisecond face alignment with an ensemble of regression trees. In Proceedings of the IEEE Conference on Computer Vision and Pattern Recognition (pp. 1867-1874).
3. Kannala, J., & Rahtu, E. (2012, November). BSIF: Binarized statistical image features. In Pattern Recognition (ICPR), 2012 21st International Conference on (pp. 1363-1366). IEEE.
4. Ojansivu, V., & Heikkilä, J. (2008, July). Blur insensitive texture classification using local phase quantization. In International conference on image and signal processing (pp. 236-243). Springer Berlin Heidelberg.