APPENDIX 1 - The funding application (to be filled out in English)

B. The project leader

B1. Curriculum Vitae of the project leader[1] (*maximum 2 pages*)

Full name: Dragoi Ioan Catalin

Date/place of birth: March 11, 1987, Targoviste, Romania

ResearcherID: Google Scholar: I0nHDMAAAAJ

Education:

• 2012 – 2016: Ph.D. in Electrical Engineering, Doctoral School of Engineering Sciences, Valahia University of Targoviste, Thesis: *Contributions to the Improvement of Prediction for Reversible Watermarking* (supervisor: prof. Dinu Coltuc).

Abstract: https://www.dropbox.com/s/yfrttgtxur949gv/Dragoi-Rezumat.pdf?dl=0

• 2010 – 2012: M.Sc. in Advanced Telecommunications, Information Processing and Transmission Systems, Valahia University of Targoviste

• 2006 – 2010: Engineer in Applied Electronics, Valahia University of Targoviste.

Professional experience:

- October 2016 - present: *Assistant Professor* with the Faculty of Electronics, Telecommunications and Information Technology, Valahia University of Targoviste.

Teaching: *Information Transmission Theory,* seminar, practical sessions, (since 2013);

       Image Processing and Shape Recognition, seminar, practical sessions (since 2015);

       Microcontroller Based Systems, practical sessions, (since 2016);

Research: reversible watermarking, image processing

Reviewer: *IEEE Trans. on Image Processing*, *IEEE Trans. on Information Forensics and Security*, *IEEE Signal Processing Letters*, *Journal of Visual Communication and Image Representation*.

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[1] [2] Sections B1 and B3 of the application will be published on UEFISCDI website. These will be uploaded in the online platform for submission, both as two separate pdf. files as well as part of the funding application.

Participant in two national projects: *New methods and investigations protocols for the early diagnosis, efficient screening, prognostic and therapy of non-melanoma skin cancers based on existing and novel micro & nano optical tools*, NANOLASCAN, PN-II-PT-PCCA-2011-3.2-1162 and *Intelligent system for management, monitoring and maintenance of pavements and roads using modern imaging techniques*, PAV3M, PN-II-PT-PCCA-2013-4-1762

IEEE Membership since 2013;

Hirsch index: 5 (Google Scholar, https://scholar.google.ro/citations?user=_I0nHDMAAAAJ&hl=en)

Author/co-author of 4 ISI Journal Papers and 9 papers in International Conferences, over 70 citations;

B2. Significant and representative scientific achievements (maximum 2 pages)

The project leader started his research in reversible watermarking in 2012 in the context of the MSc Thesis. Since then his activity has been devoted to the improvement of prediction for reversible watermarking (RW) and the design of new RW schemes in the context of his PhD Thesis and of two research projects. It should be mentioned that the best RW schemes insert the hidden data by modifying the host pixels based on their prediction error, therefore the prediction precision has a direct effect on RW performance. His main contributions to RW are as follows:

Improvement and extension of RW predictors. The project leader proposed the adaptive rhombus predictor, an approach that maintains the main strength of the rhombus average (the non-causal prediction context formed from the closest four neighbors of the predicted pixel) and removes its major drawback (fixed weights regardless of local complexity). This predictor was developed during the MSc thesis and proposed in a conference paper for *EUSIPCO2012*. Later the idea of adaptive weighting on a non-causal context was further refined by the project leader with the EGBSW predictor (presented at *IH&MMSec2014*, a very selective workshop) and the adaptive full context predictor (*ISSCS2015*). We mention that the EGBSW predictor was inspired by a causal predictor proposed for lossless compression, namely GBSW (Gradient Based Selected Weighting). We proposed a noncausal extension with extended gradient computation and improved selection of the predictor coefficients. The adaptive full context predictor of *ISSCS2015* considers the 3×3 prediction context. The 3×3 window was considered by other researchers as well, most notably by X. Li in 2013 (*IEEE Trans. on Image Processing*).

Local prediction. The main contribution to RW of the project leader is the development of a new type of linear predictor, specifically designed for RW: the local predictor. This approach provides a distinct LMS predictor for each pixel. The approach consists in creating a learning block around the current pixel, replacing the current pixel with an estimate (a key aspect that allows the reversibility of the predictor) and computing a linear predictor based on the values in the current block. The proposed scheme based on local prediction considerably outperformed the state of the art schemes at that time, bringing an average PSNR improvement of around 1.5 dB. This scheme and its faster version are both published in *IEEE Trans. on Image Processing*. In our opinion, the local prediction idea has still a great potential to provide improved RW schemes. Recently a new local prediction based on a saliency map was proposed by J. Fan (*ICIP2015*). The proposal LOW-2G will provide further refinements to local prediction.

Adaptive pairwise embedding. Another notable contribution brought by the project leader is the introduction of adaptive pairing for efficient RW based on 2D histogram modification. The previous schemes used pairs formed from two pixels connected diagonally (B. Ou, *IEEE Trans. on Image Processing,* 2013) or horizontally (also proposed by the project leader in a paper for *EUSIPCO2015*), but the performance of such schemes is determined by the correlation between the paired pixels. The gain in performance of 2D based schemes over their classic 1D counterparts is completely caused by pairs were both pixels have small absolute prediction error values. The other pairs, while necessary for capacity and/or reversibility, bring an equivalent performance to the one offered by 1D approaches. Adaptive pairing uses the prediction error as a criterion for grouping and therefore can generate a larger number of optimal pairs. Our scheme was published in *IEEE Trans. on Image Processing* in 2016 and offers the best results reported so far in literature for very low bit-rate RW.

Context embedding RW schemes. Research was also devoted to further optimize the prediction error expansion embedding scheme based on context embedding: by better prediction (*IH&MMSec2013*) and optimization for medical images (*EUSIPCO2016*).

B3. Defining elements of the outstanding scientific achievements of the project leader^2 *(maximum 3 pages)*

1. Articles

I.-C. Dragoi, D. Coltuc, Local Prediction Based Difference Expansion Reversible Watermarking, *IEEE Trans. on Image Processing*, vol. 23, no. 4, pp. 1779-1790, 2014, Impact factor: 3.735 – Top 25%
Cited: 38 ISI Web of Science Core Collection, 47 Scopus (January 2017)

I.-C. Dragoi, D. Coltuc, On local prediction based reversible watermarking, *IEEE Trans. on Image Processing*, vol. 24, no. 4, pp. 1244-1246, 2015, Impact factor: 3.735 – Top 25%
Cited: 4 ISI Web of Science Core Collection, 8 Scopus (January 2017)

I.-C. Dragoi, D. Coltuc, Adaptive pairing reversible watermarking, *IEEE Trans. on Image Processing*, vol. 25, no. 5, pp. 2420-2422, 2016, Impact factor: 3.735 – Top 25%
Cited: 1 ISI Web of Science Core Collection, 1 Scopus (January 2017)

I.-C. Dragoi, S.G. Stanciu, R. Hristu, H.-G. Coanda, D.E. Tranca, M. Popescu, D. Coltuc, Embedding complementary imaging data in laser scanning microscopy micrographs by reversible watermarking, *Biomedical Optics Express*, vol. 7, no. 4, pp. 1127-1137, 2016, Impact factor: 3.334 – Top 25%

I.-C. Dragoi, D. Coltuc, Improved rhombus interpolation for reversible watermarking by difference expansion, *Proceedings of the 20th European Signal Processing Conference (EUSIPCO2012)*, pp. 1688-1692, 2012.
Cited: 10 ISI Web of Science Core Collection, 10 Scopus (January 2017)

2. Books/ chapters (including monographs):

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Note^3:

To have the chance for funding recommendation, the project leader must demonstrate an internationally visibility average or above average activity at paragraphs 1 or 2, in Section B3. Average or above average activity in the international community:

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^{3} Please, keep the note! It is not quantified by a number of pages and it is useful for evaluators.

- *For Science and Social Sciences,* **the activity with an average or above average visibility is highly defined by the existence of at least one publication as main author (document type: „article" or „review") published in journals situated in the "top 50% of all journals published in the research field of the project proposal". The reference list with journals belonging to top 50%, red and yellow areas, is achieved according to the scores of influence (AIS) calculated by Thomson Reuters in Journal Citation Reports 2015 published by Thomson Reuters in June 2016:**

    http://uefiscdi.gov.ro/userfiles/file/PNCDI%20III/P1_Resurse%20Umane/PRECISI_2016/PRECISI_lista%20AIS%202016.pdf

- *For Arts and Humanities,* **the activity with an average or above average visibility is highly defined by the existence of at least one publication as main author (document type: „article" or „review") published in journals indexed in Arts and Humanities Citation Index:**

    http://ip-science.thomsonreuters.com/cgi-bin/jrnlst/jlresults.cgi?PC=H

- **Complementary routes for Social Sciences and Humanities:**

✓ **ERIH Plus (Int categories 1 and 2 of the evaluation from 2011):**
    https://dbh.nsd.uib.no/publiseringskanaler/erih/searchForm

✓ **Specific publications for the application field, published in prestigious international publishing houses, for social sciences, arts and humanities fields, according to the following lists:**
    http://uefiscdi.gov.ro/userfiles/file/CENAPOSS/Edituri%20prestigiu%20international%20stiinte%20sociale.pdf

    http://uefiscdi.gov.ro/userfiles/file/CENAPOSS/Edituri%20prestigiu%20international_Arte%20&%20Stiinte%20Umaniste.pdf

The main authorship is expressed depending on the field, the project leader having the responsibility to present it correctly, in relation to the standards from the field, the authorship following to be also analyzed by the panel and by the evaluators from the field; where the academic norm is to list the authors alphabetically, there will be presented the publications as co-author (with the argumentation of those academic practices).

The lack of average or above average activities to the paragraphs 1 or 2 reduces the chance for the project proposal to be financed.