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MARIE SKŁODOWSKA-CURIE ACTIONS

Individual Fellowships (IF)
Call: H2020-MSCA-IF-2015

PART B

"proposal ACRONIM"

This proposal is to be evaluated as:

Standard EF

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1 SUMMARY

Breast cancer is the leading cause of cancer deaths among females worldwide[1]. This has motivated the establishment of Breast Screening PolicyBreast Screening Policies (BSPs) to facilitate breast cancer detection at an early stage. Despite X-ray Digital Mammography (DM) is considered the gold standard technique for BSP, other screening techniques like Ultra-Sound and Magnetic Resonance Imaging (MRI) are being investigated to overcome DM limitations due to tissue superposition which can either mimic or obscure malignant pathology, and avoid X-ray radiation all together.

From the different DM alternatives, the most promising to overcome the aforementioned limitations is MRI. However, Non-mass-like enhancing (NMLE) lesions exhibit a heterogeneous appearance in breast MRI with high variations in kinetic characteristics and typical morphological parameters, and resulting in a lower reported specificity (69%) and sensitivity (75%) than mass-enhancing lesions. Combinations of morphological and temporal BI-RADS descriptors have proven to be insufficient to aid in the automated differential diagnosis of these lesions in Contrast-Enhanced MRI (CE-MRI). Newest clinical studies suggest that T2-weighted image sequences and Diffusion-Weighted Imaging (DWI) may provide additional specificity.

The aim of this fellowship is to translate these findings into a new Computer Aided Diagnosis (CAD) system. Our hypothesis is that a combination of novel descriptors extracted from multiparametric breast MRI has the potential to substantially improve the diagnostic value of the detection and classification of NMLEs.

This first and novel CAD system in multiparametric breast MRI will reduce false positive recalls and thus increase specificity. A reduction in recall of only 5% would already be clinically relevant, considering the costs and patient discomfort associated with second look ultrasound examinations and biopsies.

The experience of ViCOROB in Breast-CAD, the preliminary studies in multispectral MRI carried out in FFFFFFFFF and the clinical support from UDIAT guarantee the success of this project as well as the correct transfer of knowledge from the laboratory to the clinical site. It is also planned to commercialise the output CAD tool to clinical sites through existing medical imaging companies or via a spin-off.

The specific aims of this proposed project are to:

Aim 1:

Develop an image regularization framework for multiparametric breast MRI that includes a novel simultaneous elastic registration and segmentation algorithm. ***Impact:*** *This methodology is fundamental for a correct image regularization and dramatically impacts the correct subsequent detection and diagnosis of NMLE lesions.*

Aim 2:

Develop and apply novel image descriptors for characterizing lesion heterogeneity in T2-weighted MRI and DWI. ***Impact:*** *A combination of these image descriptors may increase the diagnostic value of existing CAD systems in breast MRI.*

Aim 3:

Develop spatio-temporal feature extraction algorithms in CE-MRI. ***Impact:*** *These algorithms from Aim 2 and 3 will facilitate the categorization of NMLEs lesions.*

Aim 4:

Evaluation of the CAD system in terms of performance compared to trained readers and gold standard. ***Impact:*** *Radiologists can benefit from this system by reduced interobserver variation and improved interpretation of breast MRIs for the presence or absence of malignant non-mass-like enhancing lesions.*

correct florida institution name

2 EXCELLENCE

Please note that the principles of the European Charter for Researchers and Code of Conduct for the Recruitment of Researchers promoting open recruitment and attractive working conditions are expected to be endorsed and applied by all beneficiaries in the Marie Sklodowska-Curie actions.

[1] Ahmedin Jemal et al. "Global cancer statistics". In: *CA: A Cancer Journal for Clinicians* 61 (2011).

2.1 Quality, innovative aspects and credibility of the research

You should develop your proposal according to the following lines:

- Introduction, state-of-the-art, objectives and overview of the action
- Research methodology and approach: highlight the type of research and innovation activities proposed
- Originality and innovative aspects of the research programme: explain the contribution that the project is expected to make to advancements within the project field. Describe any novel concepts, approaches or methods that will be employed.

The text should emphasise how the high-quality, novel research is the most likely to open up the best career possibilities for the Experienced Researcher and new collaboration opportunities for the host organisation(s).

2.2 Clarity and quality of transfer of knowledge/training for the development of the researcher in light of the research objectives

A two way transfer of knowledge should be described (please see Section 5.2 of this Guide):

- The text must show how the Experienced Researcher will gain new knowledge from the hosting organisation(s) during the fellowship through training.
- These organisations may also benefit from the previous experience of the researcher. Outline the capacity for transferring the knowledge previously acquired by the researcher to the host organisation(s).

2.3 Quality of the supervision and the hosting arrangements

Required sub-heading:

Qualifications and experience of the supervisor(s)

Information regarding the supervisor(s) must include the level of experience on the research topic proposed and document its track record of work, including the main international collaborations. Information provided should include participation in projects, publications, patents and any other relevant results. To avoid duplication, the role and profile of the supervisor(s) should only be listed in the "Capacity of the Participating Organisations" tables (see section 6 below). The text must show that the Experienced Researcher should be well integrated within the hosting organisation(s) in order that all parties gain the maximum knowledge and skills from the fellowship. The following section of the European Charter for Researchers refers specifically to career development:

Career development Employers and/or funders of researchers should draw up, preferably within the framework of their human resources management, a specific career development strategy for researchers at all stages of their career, regardless of their contractual situation, including for researchers on fixed-term contracts. It should include the availability of mentors involved in providing support and guidance for the personal and professional development of researchers, thus motivating them and contributing to reducing any insecurity in their professional future. All researchers should be made familiar with such provisions and arrangements.

2.4 Capacity of the researcher to reach and re-enforce a position of professional maturity in research

Please keep in mind that the fellowships will be awarded to the most talented researchers as shown by their ideas and their track record, where it is a fair indicator given their level of experience.

ENDPAGE

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Todo list