Faculty of Engineering
Department of Electrical & Computer Engineering

13 April, 2021
Department of Homeland Security
United States Citizenship and Immigration Services

Dear USCIS Officer,

I am writing this recommendation letter as an independent reviewer of Dr. Razvan Marinescu's research. Dr. Marinescu is a scientist of extraordinary abilities, and I strongly support his application for a permanent residence in the United States.

I am XXXX, Associate Professor in Electrical and Computer Engineering, and the deputy director of the Centre for XX Research at the National University of XXX. I am also an affiliate faculty member of the Centre for XXXX, the Institute of XXX, and the Institute for XXX at the National University of XXX, as well as the Laboratory for Computational Neuroimaging at XXXX. I serve the research community in various roles, as an editor for the peer-reviewed journals XX and XXX and on the program committee of the Organization of XXXX. I did my B.Sc. and M.Sc. in Electrical Engineering at XXX, and my PhD in Computer Science at the XXXX.

My research aims to study and understand the fundamental principles of brain network organization. My laboratory develops machine learning and artificial intelligence algorithms to automatically generate scientific discoveries from large-scale datasets comprising thousands of subjects with brain magnetic resonance imaging, behavioral, genetic and other physiological measures. My work, particularly in functional connectivity, has been rewarded with multiple prizes, such as the XX Early Career Investigator Award, and I am particularly well known for the creation of XXX, that is used in laboratories world-wide and has received more than 3400 citations to date. My research is received with great interest beyond the expert community and has been featured in the XX, the XX, XX, XX and other popular media. I am a recognized expert in applied machine learning and, like Dr. Marinescu, have also created algorithms for the prediction of Alzheimer's disease and related neurodegenerative diseases. Therefore, I believe I am more than qualified to offer this independent assessment.

I have never met Dr. Marinescu in person, but I am aware of his original scientific contributions to the field of medical artificial intelligence. I have first come in contact with his work in 2017, when my research team decided to participate in TADPOLE, the international challenge Dr. Marinescu organized which aimed to evaluate algorithms that predict the progression of Alzheimer's disease. TADPOLE is a one-of-a-kind challenge and benchmark for comparing a variety of algorithms and methods for the challenging task of predicting Alzheimer's disease, a key neurodegenerative disease affecting millions of people worldwide. While previous algorithms in our research field were all tested on different datasets and with different target variables to be predicted, TADPOLE created a standardized evaluation framework which made all algorithms' performance comparable. Thirty-three international teams from nine different

countries, with approximately three members each, participated in the challenge, and submitted a total of ninety-two prediction algorithms.

Dr. Marinescu has also been the key leader in the organization and running of the TADPOLE Challenge, and played a critical role at various points along the process. He was among the four main organizers (alongside Daniel Alexander, Neil Oxtoby and Alexandra Young) who initially came up with the design of the challenge and created the website detailing the competition, co-created with Neil Oxtoby the datasets for the teams, assisted the teams with running their algorithms and with the tasks they had to solve, solely evaluated and analyzed all the prediction results, and liaised with all the participating teams on accurately synthesizing the description of their algorithms in the final manuscript. Dr. Marinescu presented these results in three scientific articles that already have more than 60 citations. He also presented the final results at the Medical Image Computing and Computer Assisted Surgery (MICCAI) International Conference, the leading venue in medical AI, as well as at the Alzheimer's Association International Conference, the top conference on Alzheimer's disease research.

Through TADPOLE, Dr. Marinescu made a huge scientific contribution to our research field. First, it helped establish how well and how early we can predict Alzheimer's disease with computational algorithms, what are the state-of-the-art algorithms for Alzheimer's disease prediction, and what types of input data are most informative for such predictions. Secondly, Alzheimer's disease is a devastating disease worldwide, with currently more than 50 million people affected, and having associated costs of approximately $100 billion in the United States alone. The ability to detect the disease early, using such AI algorithms, can improve the healthcare management of millions of people worldwide, and also lower the economic costs and caregiver efforts for managing Alzheimer's disease patients.

Dr. Marinescu is also one of the leading experts in disease progression modelling, having published several articles on this topic. First, he published DIVE[1], a novel vertexwise model for learning and clustering temporal trajectories of Alzheimer's disease subjects. The DIVE model was a highly original contribution to the field and was very well-received at the Information Processing for Medical Imaging conference (IPMI), having been nominated for the Francois Erbsmann prize. As an expert in the field, I can attest that IPMI is one of the leading venues in medical image analysis and medical artificial intelligence, and only outstanding contributions are considered for the Francois Erbsmann prize at IPMI. The paper has since gathered 23 citations, and a follow-up model[2] that builds on DIVE has already been implemented by the research team at INRIA, France. In addition, Dr. Marinescu's DIVE article was published in the NeuroImage journal. As the editor of the journal myself, I can confirm that the acceptance standards are very high, with only the best articles being accepted for publication.

[1] Marinescu, Razvan V., et al. "DIVE: A spatiotemporal progression model of brain pathology in neurodegenerative disorders." NeuroImage 192 (2019): 166-177.

[2] Abi Nader, Clement, et al. "Monotonic Gaussian Process for spatio-temporal disease progression modeling in brain imaging data." NeuroImage 205 (2020): 116266.

Dr. Marinescu has also authored other prominent works on disease progression models. The "SuStaIn" model, published in the Nature Communications journal, is a novel technique that can find, within a disease population, multiple sub-populations that progress with different disease patterns. The SuStaIn model discovered that, in Frontotemporal Dementia, the patients with a specific mutation (C9orf72) were actually composed of two distinct groups, instead of a single uniform group as it was believed until that time. Dr. Marinescu also used disease progression models to study not just Alzheimer's disease or Frontotemporal Dementia, but other key neurodegenerative diseases such as Posterior Cortical Atrophy, Multiple Sclerosis and Huntington's Disease, having authored and co-authored more than 4 scientific articles on these neurodegenerative diseases.

As an expert in the field, I can attest that Dr. Marinescu published in the leading journals and conferences in medical AI as well as neurology. The Medical Image Computing and Computer Assisted Surgery (MICCAI) conference, where Dr. Marinescu authored three papers, is the leading venue on theoretical and technical work on artificial intelligence and machine learning for medical applications, having an impact factor of 11.14. On the other hand, the neurology journal "Brain", where Dr. Marinescu authored two articles, one as joint-first author and the other as second author, is the one of the leading journals on neurology and neuroscience, which has been circulating since 1878 and has an impact factor of 11.33.

To conclude, Dr. Marinescu is scientist of extraordinary ability, who has made many contributions to our research field. He is a highly recognized leader in disease progression modeling and artificial intelligence prediction algorithms for medicine, two very important scientific areas. If he is to stay in the United States, he would be a great asset to the country, and can continue to make important new contributions in research and beyond. I therefore urge you to favorably consider his application for permanent residence in the United States.

Very Truly Yours,

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Associate Professor, Department of Electrical & Computer Engineering
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