

**GIULIA VARRIANO****ISTRUZIONE E FORMAZIONE**

2010 - 2015 Campobasso, Italia

DIPLOMA INDIRIZZO PROGRAMMATORI ISTITUTO TECNICO ECONOMICO "L.PILLA"**Indirizzo** Via Veneto, 86100, Campobasso, Italia

2015 - 2018 Pesche, Italia

LAUREA TRIENNALE IN INFORMATICA UNIVERSITÀ DEGLI STUDI DEL MOLISE**Indirizzo** C.da Fonte Lappone, 86090, Pesche, Italia

2018 - 2020 Pesche, Italia

LAUREA MAGISTRALE IN SICUREZZA DEI SISTEMI SOFTWARE UNIVERSITÀ DEGLI STUDI DEL MOLISE**Indirizzo** C.da Fonte Lappone, 86090, Pesche, Italia

2019 - 2019

24 CFU PER LA SCUOLA UNIVERSITÀ DEGLI STUDI DEL MOLISE

2020 - ATTUALE Campobasso, Italia

DOTTORATO IN MEDICINA TRASLAZIONALE E CLINICA - XXXVI CICLO UNIVERSITÀ DEGLI STUDI DEL MOLISE

- Attività formative con corsi obbligatori e trasversali forniti dall'Unimol e da Enti Internazionali;
- Attività scientifica con pubblicazione di paper a giornali e conferenze, entrambi nazionali e/o internazionali;
- Attività di didattica integrativa nel Corso di Laurea Triennale di Ingegneria Medica dell'Unimol;
- Attività di assistenza tesi nei Corsi di Laurea Triennale di Ingegneria Medica, Informatica e nel Corso di Laurea Magistrale di Ingegneria Biomedica dell'Unimol.

Indirizzo Via F. De Sanctis, 86100, Campobasso, Italia

2022 Campobasso

INGEGNERE DELL'INFORMAZIONE Università degli studi del Molise**COMPETENZE LINGUISTICHE**Lingua madre: **ITALIANO**

Altre lingue:

COMPRENSIONE		ESPRESSIONE ORALE		SCRITTURA
Ascolto	Lettura	Produzione orale	Interazione orale	
INGLESE B1	B2	B1	B1	B1

● ULTERIORI INFORMAZIONI

PUBBLICAZIONI

[On the Adoption of Radiomics and Formal Methods for COVID-19 Coronavirus diagnosis](#) - 2021

Considering the current pandemic, caused by the spreading of the novel Coronavirus disease, there is the urgent need for methods to quickly and automatically diagnose infection. To assist pathologists and radiologists in the detection of the novel coronavirus, in this paper we propose a two-tiered method, based on formal methods, aimed to (i) detect whether the patient lungs are healthy or present a generic pulmonary infection; (ii) in the case of the previous tier, a generic pulmonary disease is detected to identify whether the patient under analysis is affected by the novel Coronavirus disease.

MDPI Diagnostic Journal. A. Santone, M. P. Belfiore, F. Mercaldo, G. Varriano and L. Brunese

[Early Diagnosis of Liver Metastases from Colorectal Cancer through CT Radiomics and Formal Methods: A Pilot Study](#)

- 2022

Liver metastases are a leading cause of cancer-associated deaths in patients affected by colorectal cancer (CRC). The multidisciplinary strategy to treat CRC is more effective when the radiological diagnosis is accurate and early. Despite the evolving technologies in radiological accuracy, the radiological diagnosis of Colorectal Cancer Liver Metastases (CRCLM) is still a key point. The aim of our study was to define a new patient representation different by Artificial Intelligence models, using Formal Methods (FMs), to help clinicians to predict the presence of liver metastasis when still undetectable using the standard protocols.

MDPI Journal of Clinical Medicine. A Rocca, MC Brunese, A Santone et al.

[4° Premio presso congresso Associazione Italiana di Telemedicina ed Informatica Medica \(@ITIM\)](#) -

2021

21° congresso nazionale @ITIM

[Explainability of radiomics through formal methods](#) - 2022

[Artificial Intelligence](#) has proven to be effective in radiomics. The main problem in using Artificial Intelligence is that researchers and practitioners are not able to know how the predictions are generated. This is currently an open issue because results' explainability is advantageous in understanding the reasoning behind the model, both for patients than for implementing a feedback mechanism for medical specialists using decision support systems.

Addressing transparency issues related to the Artificial Intelligence field, the innovative technique of Formal methods use a mathematical logic reasoning to produce an automatic, quick and reliable diagnosis. In this paper we analyze results given by the adoption of Formal methods for the diagnosis of the [Coronavirus](#) disease: specifically, we want to analyse and understand, in a more medical way, the meaning of some radiomic features to connect them with clinical or radiological evidences.

G Varriano, P Guerriero et. al. Computer Methods and Programs in Biomedicine.

[Increasing differential diagnosis between lipoma and liposarcoma through radiomics: a narrative review](#)

- 2023

Soft tissue sarcomas (STSs) are rare, heterogeneous, and very often asymptomatic diseases. Their diagnosis is fundamental, as is the identification of the degree of malignancy, which may be high, medium, or low. The Italian Medical Oncology Association and European Society of Medical Oncology (ESMO) guidelines recommend magnetic resonance imaging (MRI) because the clinical examination is typically ineffective. The diagnosis of these rare diseases with artificial intelligence (AI) techniques presents reduced datasets and therefore less robust methods. However, the combination of AI techniques with radiomics may be a new angle in diagnosing rare diseases such as STSs. Results obtained are promising within the literature, not only for the performance but also for the explicability of the data. In fact, one can make tumor classification, site localization, and prediction of the risk of developing metastasis. Thanks to the synergy between computer scientists and radiologists, linking numerical features to radiological evidence with excellent performance could be a new step forward for the diagnosis of rare diseases.

Natella, R., Varriano, et al. Exploration of Targeted Anti-tumor Therapy, 4(3), 498.

Predicting risk of metastases and recurrence in soft-tissue sarcomas via Radiomics and Formal Methods

- 2023

Objective Soft-tissue sarcomas (STSs) of the extremities are a group of malignancies arising from the mesenchymal cells that may develop distant metastases or local recurrence. In this article, we propose a novel methodology aimed to predict metastases and recurrence risk in patients with these malignancies by evaluating magnetic resonance radiomic features that will be formally verified through formal logic models.

Materials and Methods This is a retrospective study based on a public dataset evaluating MRI scans T2-weighted fat-saturated or short tau inversion recovery and patients having "metastases/local recurrence" (group B) or "no metastases/no local recurrence" (group A) as clinical outcomes. Once radiomic features are extracted, they are included in formal models, on which is automatically verified the logic property written by a radiologist and his computer scientists coworkers.

Results Evaluating the Formal Methods efficacy in predicting distant metastases/local recurrence in STSs (group A vs group B), our methodology showed a sensitivity and specificity of 0.81 and 0.67, respectively; this suggests that radiomics and formal verification may be useful in predicting future metastases or local recurrence development in soft tissue sarcoma.

Discussion Authors discussed about the literature to consider Formal Methods as a valid alternative to other Artificial Intelligence techniques.

Conclusions An innovative and noninvasive rigorous methodology can be significant in predicting local recurrence and metastases development in STSs. Future works can be the assessment on multicentric studies to extract objective disease information, enriching the connection between the radiomic quantitative analysis and the radiological clinical evidences.

Casale Roberto, Varriano Giulia et al. JAMIA open 6.2 (2023): ooad025.

CONFERENZE E SEMINARI

12/05/2022 - 15/05/2022 - Palacongressi di Rimini

Associazione Italiana di Medicina Nucleare ed Imaging Molecolare - Evaluating lung perfusion SPECT/CT imaging in patients with COVID-19 through radiomics and formal methods The inflammatory cascade in patients (pts) with COVID-19 may lead to pulmonary embolism (PE), worsening prognosis. Lung perfusion SPECT/CT (Q-scan) in symptomatic pts discharged after COVID-19 can confirm or rule out pulmonary vascular involvement, helping the differential diagnosis with other respiratory diseases. We aim to investigate an innovative methodology, based on radiomic features and formal methods, as a virtual second look able to detect perfusion abnormalities to better define appropriate patient-centered diagnostic and therapeutic strategies.

Link <https://pesquisa.bvsalud.org/global-literature-on-novel-coronavirus-2019-ncov/resource/pt/covidwho-1894699>

26/06/2023 - 30/06/2023 - Torino

2023 IEEE 47th Annual Computers, Software, and Applications Conference (COMPSAC) - Computational cost of CT Radiomics workflow: a case study on COVID-19 Background and objective The images produced by radiological exams are in DICOM format, the medical imaging standard that includes a large amount of information about the exam and the patient. In a Computed Tomography exam there can be more than 300 DICOM images per patient: this means that Radiomics could addresses the problem of being time and resource-consuming. The research question is: reducing images can lead to improved diagnostic performance?

Methods The study was focused on the classification of healthy, COVID-19 and Lung disease patients. For each patient, a few central images from the Computed Tomography exam are selected, where it is assumed that there is the greatest likelihood of seeing the disease marks. Consequently, this study provides the use of formal and mathematical techniques in order to obtain an early and robust automated diagnosis of COVID-19. In the first phase, the classification is focused on healthy patients, while for COVID-19 patients there is a second phase. The verification will be done on the entire CT examination and then on the CT examination with central selected slices.

Results Results on the original exam are no different from those on the reduced exam on the first phase, and this could an advantage due to the robustness of Formal Methods. In the second phase of the study, almost all indexes become underperforming.

Conclusions A reduced quantity of medical images can be an advantage for medical doctors, but it is not beneficial for diagnosis, as performance remains unchanged or worsens. Indeed, it can be said that disease-relevant information is also taken in the first or last parts of the radiological exam, leading to the claim that Radiomics "sees what the human eye does not see".

Link <https://www.computer.org/csdl/proceedings-article/compsac/2023/269700b539/1PhDNSBhJqU>

Campobasso , 13/10/2023

Giulia Varriano