Foreign language, Professional oriented course

Faridoddin Shariaty

Introducing

- Educational background
- Scientific background
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Course objectives:

- How to find proper scientific information for a specific purpose,
- How to start reading scientific texts in English,
- How to present different topics at international events in English,
- How to write scientific reports in English.

Tasks during the semester:

During semester it is necessary to collect 10 points:

- Make a presentation – about 10 mins – 5 points
- Ask questions after presentations – 1 point
- Participate in interview – 3 points
- Write a short article (scientific report) in English for international conferences – max 3 participates – 10 points
- Suggest any tasks which you think that help you to improve your English

Why English?

- Your opinions...

Why Learning English language is important?

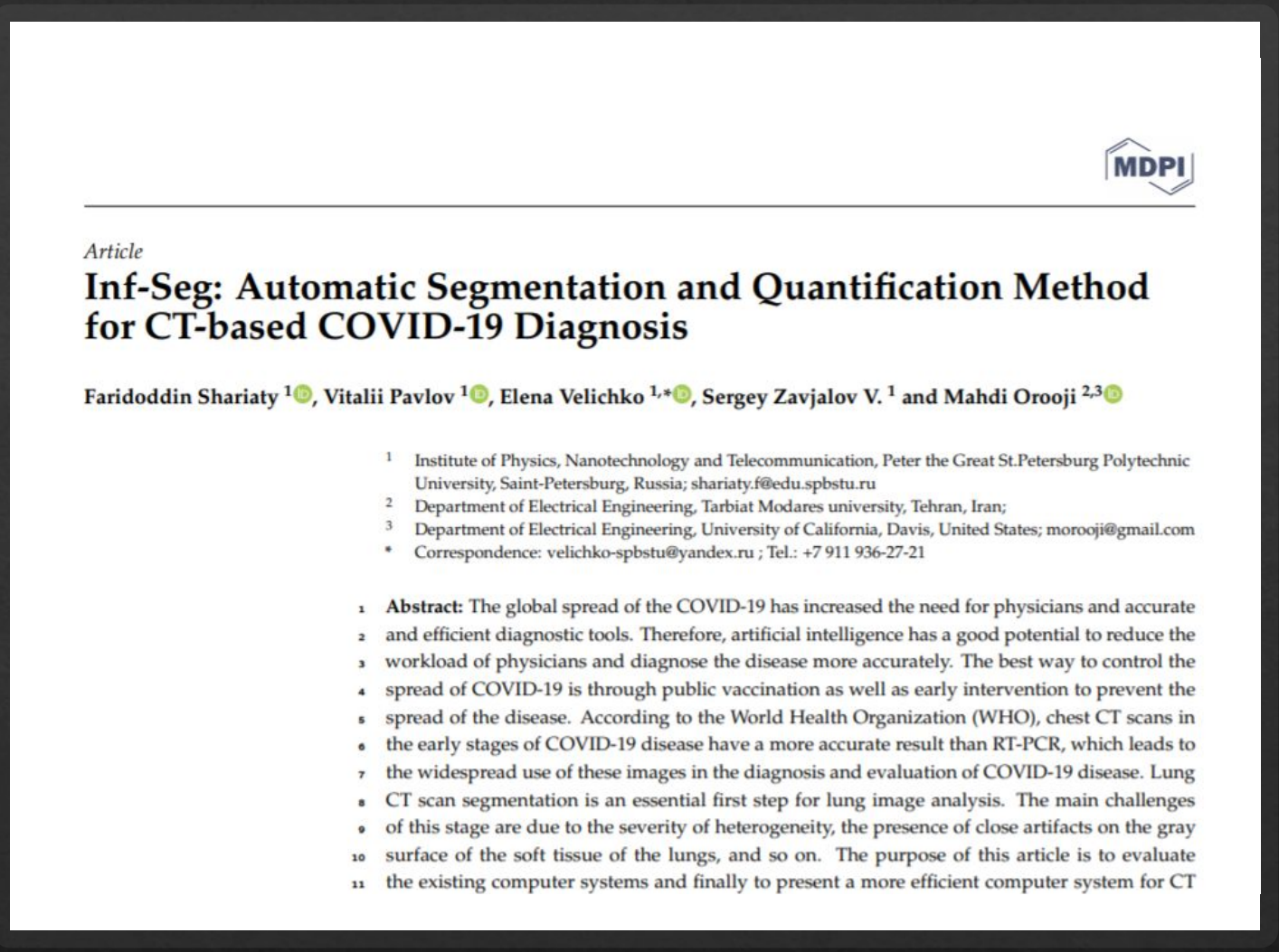
- Perfect communication – It is important to speak effectively. People get impressed by those who have good communication skills.
- Gain Confidence – If you own good communication skills then your confidence will automatically be high.
- Achieve your goal early – Effective English language skills help you meet your career goals quickly.
- Effective personality – When we speak effectively and with confidence, anyone can get attracted.
- Part of the Global community – English language is a part of the global world. So, if one knows good English then one can interact with others.
- Multiple Career Prospects – A person possessing effective communication skills have more career opportunities than others.

Structure of a Scientific report (Article)

- Title
- Authors
- Abstract
- Keywords
- Introduction (review of literature)
- Methods
- Results
- Discussion
- Conclusion
- Acknowledgement
- Ethical statement
- References

Title

- The title should be concise, informative and meaningful and include key terms, to help make it more discoverable when people search online,



MDPI

Article

Inf-Seg: Automatic Segmentation and Quantification Method for CT-based COVID-19 Diagnosis

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Abstract: The global spread of the COVID-19 has increased the need for physicians and accurate and efficient diagnostic tools. Therefore, artificial intelligence has a good potential to reduce the workload of physicians and diagnose the disease more accurately. The best way to control the spread of COVID-19 is through public vaccination as well as early intervention to prevent the spread of the disease. According to the World Health Organization (WHO), chest CT scans in the early stages of COVID-19 disease have a more accurate result than RT-PCR, which leads to the widespread use of these images in the diagnosis and evaluation of COVID-19 disease. Lung CT scan segmentation is an essential first step for lung image analysis. The main challenges of this stage are due to the severity of heterogeneity, the presence of close artifacts on the gray surface of the soft tissue of the lungs, and so on. The purpose of this article is to evaluate the existing computer systems and finally to present a more efficient computer system for CT

Keywords

- They will be used to index with article, helping to make it more discoverable.
- When choosing keywords, think about the kinds of terms you would use when searching online for related articles.

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Keywords: Automated Segmentation; COVID-19; Artificial Intelligence; Computed Tomography

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Abstract

- Abstract should give readers a brief summary of your article.
- It should concisely describe the contents of your article and include key terms (especially in the first two sentences, to increase search engine discoverability).
- States methodology used, main results obtained, and conclusions.

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Keywords: Automated Segmentation; COVID-19; Artificial Intelligence; Computed Tomography

Introduction

- This should be concise and describe the nature of the problem under investigation and its background.
- It should also set your work in the context of previous research, citing relevant references.

1. Introduction

Coronavirus, or COVID-19, is an epidemic disease caused by SARS-CoV-2 that has spread worldwide in a short period, according to the global records from the Center for Systems Science and Engineering (CSSE) at Johns Hopkins University (JHU) [1] as of May 5, 2021, it has resulted in 2 million cases and 200,000 confirmed deaths. As a result, the World Health Organization (WHO) declared this disease as an epidemic disease. To control the spread of the virus, the most important tool after general vaccination (which is not currently available to most people) is the screening of a large number of suspected cases for quarantine and appropriate treatment. The main tool for the current diagnosis of COVID-19 is RT-PCR, while, in addition to the time-consuming nature of this test, the lack of equipment, and strict conditions for testing environment, the sensitivity of this test is not high enough and can not effectively prevent epidemics. Thus, false negatives of RT-PCR are a potential threat to the general health of the community, which not only causes other people to become infected with the virus, but the virus also progresses in the patient's lungs and reduces the chances of survival.

Method

- This section should provide sufficient details of the experiment, simulation, statistical test or analysis carried out to generate the results such that the method can be repeated by another researcher and the results reproduced.

2. Patients and Methods

2.1. Patients

Patients with flu-like symptoms and an initial diagnosis of COVID-19 were chosen for the study, independent of their age or gender, and high-resolution CT (HRCT) scans were taken of the patients. From early 2020 to April 2020, imaging was performed on COVID-19 patients between 3 and 6 days after the onset of the disease.

2.2. Database acquisition

300 cases were acquired from Shariati Hospital (associated with Tehran University of Medical Sciences) and Taleghani Hospital of Tehran (affiliated with the Shahid Beheshti University of the Medical Sciences) in order to reach a reliable and extensible result. Every case study that was considered had a histopathologic confirmation to ensure that the patient had COVID-19. The CT scans' slice thickness ranged from 1 to 6 mm, and the number of slices per scan ranged from 226 to 389. The CT scan images were taken using a Siemens scanner with a kilovoltage peak distribution of 120–140 KVp and currents ranging from 25 to 40 mAs, depending on the patient's health. Each slice featured a 512 512 pixel XY planar resolution and a 16-bit grayscale resolution in Hounsfield Units (HU).

2.3. Pre-Processing

After creating gray-scale images, an experienced radiologist reviewed the CT scan images. Following that, slices from the CT scan image were chosen that showed illness symptoms. On lung CT scans, another pre-processing procedure was used to improve the quality of the images for improved diagnostic outcomes. This stage is critical because the lungs include various features that can make a precise diagnosis difficult. Linear interpolation [17], middle filter [18], morphological operation [19], Gaussian filter [20], and weight addition filter [21] are some of the pre-processing methods available. In this work, a gradient filter was utilized to improve the quality of CT scan images. Filtering entails the creation of a neighborhood (typically a small rectangle) and the application of

Results

- The results section should detail the main findings and outcomes of your study.
- You should use tables only to improve conciseness

3. Experimental Results and Discussion

3.1. The performance of the deep learning method

Table 2 shows the diagnostic functions of the proposed EDECOVID-net. The network can distinguish the COVID-19 group from the edema groups with an AUC of 0.994.

Table 2: Results of proposed EDECOVID-net.

	Accuracy	Sensitivity	Specificity	PPV	NPV
EDECOVID-net	0.98	0.98	0.98	0.98	0.98

3.2. Compare the performance of deep methods

The best deep learning networks were used in this study to classify the medical images for diagnosing COVID-19 from edema. The results of deep learning show that these methods can make a good distinction between these two diseases with similar symptoms and speed up the healing process. According to Fig. 5, Fig. 6, Table 3 and Table 4, the EDECOVID-net yielded the best results. The most appropriate method is that with a higher sensitivity for diagnosing patients with COVID-19. In this regard, the EDECOVID-net, which has the highest sensitivity and AUC compared to other networks, especially VGG-16, is known as the best method.

A review of previous studies indicates that researchers have failed to consider differentiation between the COVID-19 disease and edema using a deep

Discussion

- This should discuss the significance of the results and compare them with previous work using relevant references.

5. Discussion

In this paper, we present TAM by using Active Contour algorithm. As mentioned, in recent years, interest in model-based segmentation methods has increased. One of the advantages of these methods is that, even when some object information is lost, such gaps can be filled using the previous information in the model. In this section, the performance of this algorithm, Active Contour, Region Growing, and the combination of Active Contour and Watershed algorithms are studied. Table 3 presents the results of the implementation and testing of these four algorithms on the lung CT scans. According to the presented results, the proposed algorithm has a better performance for nodule segmentation and has a lower false discovery rate, which means the stability of the algorithm is acceptable. Due to the proximity of the combination of Active Contour and Watershed algorithms, in the next step, by adding noise to the CT scan, the performance of these four algorithms is re-examined.

Table 3 also contains the results lung nodule segmentation in CT scan images in the presence of Gaussian and Speckle noise. According to the obtained results, it can be concluded that the model based proposed algo-

Conclusion

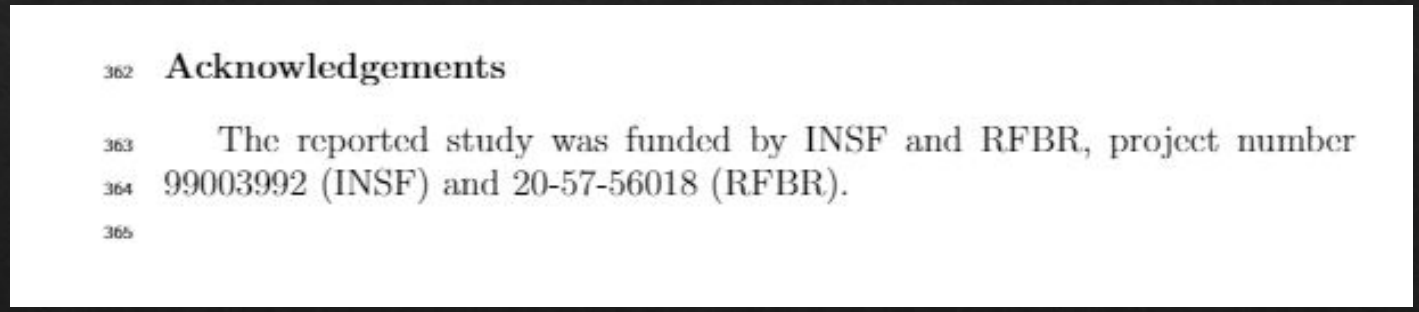
- This section should be used to highlight the novelty of the work, and any plans for future relevant work.

Conclusion

We have developed a new algorithm for segmenting the nodule in the lung that can segment all types of nodules with high performance. This algorithm is model-based and along with the active contour algorithm to increase the accuracy of the algorithm and eliminate false positives through the detection of the initial mask. The results of segmentation of lung nodules in normal CT image is as follows: precision of 85.5, Dice of 85, accuracy of 96, and specificity of 98, which works better than the active contour algorithm, the Region Growing algorithm, and the combination of active contour and water growth algorithms. In addition, in the presence of noise, our algorithm

Acknowledgements

- Author names and Funding information or the name of the funding agency and the grant number should be given.



362 **Acknowledgements**

363 The reported study was funded by INSF and RFBR, project number
364 99003992 (INSF) and 20-57-56018 (RFBR).
365

Ethical statement

- Some articles will require an ethical statement, particularly those that are reporting research involving humans or animals. This should state if the research was approved by any ethical committee.

375 **Ethical approval**

376 All procedures performed in studies involving human participants were in
377 accordance with the ethical standards of the institutional and/or national re-
378 search committee and with the 1964 Helsinki declaration and its later amend-
379 ments or comparable ethical standards.

References

- This section should be used to list all relevant work.

References

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