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Artificial Intelligence

Detection of Human Respiration under Building Debris Model using Temporal Convolutional Networks

Özden Niyaz[1]; Peyman Mahouti[1]; Burcu Erkmen[1]

*Corresponding author: oniyaz@yildiz.edu.tr

[1]Address: Electronics and Communications Engineering Department, Yıldız Technical University, Esenler, Istanbul 34220, Türkiye

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Finding people in collapsed buildings after disasters is crucial for rescue efforts. Despite the use of various methods, there are still challenges to ensure accurate and quick rescues. The rapid detection of living people under debris is crucial. This study aims to introduce a new method: using a type of artificial intelligence called Temporal Neural Networks (TCN) to find human respiration under building debris by generating new computer-simulated electromagnetic data as shown in Figure 1. To achieve this, an electromagnetic simulation program is used to create a realistic model of building debris and a human. The data is then used for simulating body movements which are indicating respiration. Measurements are taken between 150 MHz and 650 MHz in different scenarios. The measurements are enriched with different levels of noise, and different respiration patterns are created. The result is 15 different subsets with a data size of 2x216.000. The respiration of humans trapped under debris is detected with a success rate of 99.97%. This demonstrates the effectiveness of this method and indicates its potential for further testing.

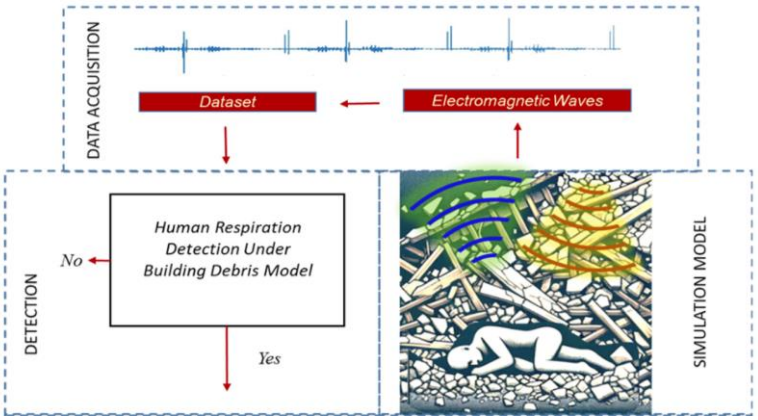


Figure 1: Overview of the Proposed Method [1]

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References:

[1] Niyaz, Ö., Tüylü, T., Mahouti, P., Erkmen, B., Türker Tokan, N. *Detection and classification of human respiration under building debris model using VHF/UHF waves*. Neural Computing & Applications (2024). https://doi.org/10.1007/s00521-024-09848-y