

I. INTRODUCTION

There are numerous factors that can lead to fires in the surrounding environment, causing extensive damage and significantly impacting both life and activities within that area [1], [2]. Effective and timely detection and prevention of fires can help mitigate these losses. Hence, the need for a fast and accurate fire detection system is crucial in preventing fire disasters in specific regions [3]. Fire detection is a critical field that has yet to be comprehensively explored. It relies on the challenge of differentiating images based on color, shape, size, and other characteristics [1]. While humans can easily identify fire hazards, fires often emerge unexpectedly from various unforeseen sources, making early detection challenging for many individuals [3]. Even seemingly straightforward scenarios, such as fires caused by cigarette butts, can prove difficult to detect rapidly and accurately. To address this issue, a robust system leveraging fire patterns will be developed for fire detection. In prior research, an innovative fire recognition algorithm was introduced, showcasing a remarkable blend of accuracy and efficiency for intelligent monitoring systems. This algorithm exhibits versatility and achieves superior recognition rates across diverse fire scenarios. By employing a low-complexity feature detection technique, the algorithm effectively filters fire images, leading to enhanced accuracy in fire identification. Furthermore, ongoing investigations aim to extend the algorithm's capabilities to accurately detect and filter smoke in complex environments, enabling more effective warnings during fire incidents. This research contributes to the advancement of fire detection methodologies, emphasizing the importance of accuracy and efficiency in addressing fire-related challenges [4], [5].