(12) PATENT APPLICATION PUBLICATION
(19) INDIA
(22) Date of filing of Application :31/07/2023

(21) Application No.202341051379 A
(43) Publication Date : 01/09/2023

(54) Title of the invention : AN OPEN-ENDED CONTINUAL LEARNING FOR FOOD RECOGNITION USING CLASS INCREMENTAL EXTREME LEARNING MACHINES

(51) International classification :G06N0003080000, G06K0009620000, G06N0003040000, G06N0020000000, G06N0005040000
(86) International Application No :PCT// /
Filing Date :01/01/1900
(87) International Publication No : NA
(61) Patent of Addition to Application Number :NA
Filing Date :NA
(62) Divisional to Application Number :NA
Filing Date :NA

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(57) Abstract :
State-of-the-art deep learning models for food recognition do not allow data incremental learning and often suffer from catastrophic interference problems during the class incremental learning. This is an important issue in food recognition since real-world food datasets are open-ended and dynamic, involving a continuous increase in food samples and food classes. Model retraining is often carried out to cope with the dynamic nature of the data, but this demands high-end computational resources and significant time. This invention proposes a new open-ended continual learning framework by employing transfer learning on deep models for feature extraction, Relief F for feature selection, and a novel adaptive reduced class incremental kernel extreme learning machine (ARCIKELM) for classification. Transfer learning is beneficial due to the high generalization ability of deep learning features. Relief F reduces computational complexity by ranking and selecting the extracted features. The novel ARCIKELM classifier dynamically adjusts network architecture to reduce catastrophic forgetting. It addresses domain adaptation problems when new samples of the existing class arrive. To conduct comprehensive experiments, we evaluated the model against four standard food benchmarks and a recently collected Pakistani food dataset. Experimental results show that the proposed framework learns new classes incrementally with less catastrophic inference and adapts domain changes while having competitive classification performance.

No. of Pages : 11 No. of Claims : 5