

ICRAMCS 2026

THE EIGHTH EDITION OF THE INTERNATIONAL CONFERENCE ON
RESEARCH IN APPLIED MATHEMATICS AND COMPUTER SCIENCE
April 23-24-25, 2026 | Marrakech, Morocco



Image Segmentation using Evidential Markov Model

Communication Info

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Keywords:

- (1) Fuzzy Evidential Mass
- (2) HMC-IN
- (3) EMC-IN
- (4) Triplet Markov Model
- (5) Evidential Dempster-Shafer Theory

Abstract

Hidden Markov Models (HMMs) are widely used in image processing, especially for image segmentation.

In this work, we present the Evidential Markov Chain (EMC) [1], a recent Markov model based on Dempster-Shafer evidence theory [2]. This model can better represent uncertainty in real data such as ambiguity, imprecision, and conflicting information.

In EMC[3], the probabilities are replaced by evidential masses: the *a priori* probabilities $p(x)$ becomes $m_1(x)$ and the observation probabilities $p(y|x)$ becomes $m_2(x)$.

They are combined using DS fusion:

$$(m_1 \oplus m_2)(x),$$

which plays a role like the *posterior probabilities* $P(X | Y)$.

We compare EMC with independent noise (EMC-IN) to the classical hidden Markov chain with independent noise (HMC-IN) for segmenting some color images, using PSNR and pixel error rate for evaluation.

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References

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