A hybrid intelligent software system was designed to accept a ventilation-perfusion (VQ) scan image of lungs and generate a conclusion as the probability of pulmonary embolism (PE) for the patient. The intelligent decision making system is based on a fuzzy knowledge-based (expert) system. A suite of computational intelligence tools including fuzzy logic, expert systems, artificial neural networks, and an induction machine learning algorithm was utilized to represent and model knowledge and to implement the probabilistic reasoning process of an experienced radiologist. Rule base for the fuzzy expert system was created using two complementary sources. Domain expert knowledge was extracted to define heuristic rules. An induction-based machine learning algorithm (i.e., ID3 or one of its derivatives) was employed to discover/define rules for those cases where the domain expert was not able to specify or formulate rules but, instead, could easily generate examples. A subset of VQ scan image features, which was employed as decision factors by the fuzzy expert system, were identified using an unsupervised and self-organizing artificial neural network algorithm, the Kohonen neural network. An additional feature set identified by the radiologist enhanced the feature set defined by the Kohonen network. A supervised learning artificial neural network, multi layer perceptron with backpropagation learning algorithm, was employed to define the membership functions for the fuzzy attributes. This hybrid intelligent system forms the basis for a sophisticated model that can realistically approximate the radiologist's probabilistic reasoning process while possessing ability to see beyond what the radiologist can visually observe.