

restricting the agents to specific procedures (that are known to be norm compliant). Such a mechanism of active

norm enforcement ensures a good balance between autonomy and conformity in an institution.

### Self-Organizing Neural Networks in the Characterization of Interstitial Lung Diseases in Chest Radiographs

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#### Abstract

The technological development provides an improvement in the quality of life due to easiness, speed and flexibility in the access to the information. In the biomedical area, the technology is admitted as an important allied, allowing the fast development of methods and techniques that assist the professional in the health care. Recent advances in the computerized analysis of medical images contribute for the precocious diagnosis of a series of diseases. In this work, a methodology for the development of a computational system for characterization of patterns in pulmonary images, based on techniques of artificial neural networks is presented. In the study, has searched for the verification the use of self-organizing neural networks as a feature extraction and dimensionality reduction tool of chest radiographs, willing to characterize

interstitial lung disease. For the dimensionality reduction and feature extraction, an algorithm based on Self-Organizing Maps was implemented, with some variations, getting a reduction of about three million pixels that it composes an image, for 240 elements. For the pattern classification, a Multilayer Perceptron was used, validated with the leave-one-out methodology.

With a database containing 79 samples of linear pattern, 37 samples of nodular pattern, 30 samples of mixed pattern, and 72 samples of normal pattern, the classifier provided an average result of 89.5% of right classification, with 100% of right classification for linear pattern, 67.5% for nodular pattern, 63.3% for mixed pattern, and 100% for normal pattern. The results prove the validity of the methodology.

### Specifying and Analyzing Institutions in Multi-Agent Systems using Answer Set Programming

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#### Abstract

It is recognized that normative systems, and in particular electronic institutions and contracts are a potentially powerful means for making agent interactions in multi-agent systems effective and efficient. However, correctly specifying the behaviour of such systems is a difficult problem. Designers are faced with two concurrent, complex tasks: first, they must specify the relationships (over time) between agents' actions and their effects, and secondly they must also consider how agents' actions are to be regulated through the definition of agents' permissions and obligations. Such systems are typically complex, and given this complexity it may be difficult for a designer to determine whether their original objectives have been captured by the specification of the system. In this dissertation, we seek to address some of the problems associated with institutional specification. In order to do

this, we present a model for specifying institutions based on the notion of socially constructed reality that accounts not only for how the action and events, which constitute the institution, are described, but also how they are regulated.

Institutions may be used in a number of ways, and may account for concepts at varying levels of abstraction. Recognizing this, we also investigate how several institutions, each accounting for a particular aspect of a society may be composed and how the relationships between these institutions may be expressed. Given this model, we then demonstrate how, using the answer set programming paradigm institutional specifications based on our model may be checked for the absence or presence of certain (un)desirable properties.

### Diagnosing Coordination Faults in Multi-Agent Systems

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