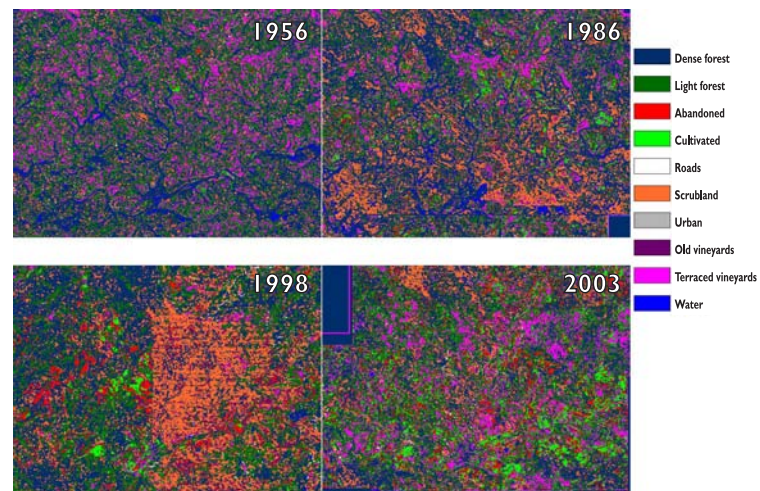
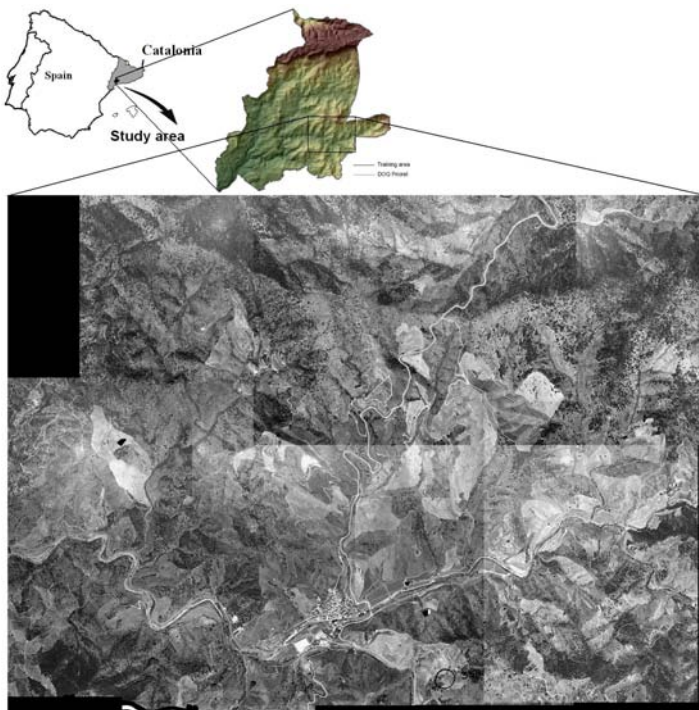


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## INTRODUCTION

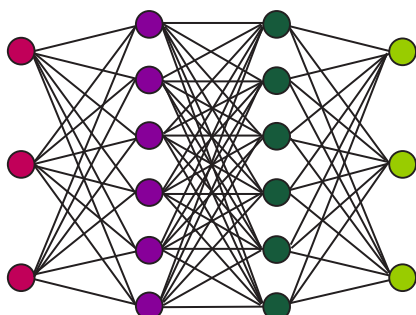
The region of Priorat in Catalonia is in one of the oldest wine-producing areas in Spain, having produced vintages since the 12th century. Recent successes including L'Ermita, which sells for over 150 per bottle, have highlighted the continuing success of the region's vineyards. However, since the beginning of the 20th century until 1992, most of the steeply-terraced vineyards in the region were abandoned. It is only in the last decade that there has been an increase in production and development of new terraced vineyards. This has been partly due to a recognition of the quality of the wine produced, and also through the introduction of subsidies for local farmers and the interest of large companies. Priorat therefore is a prime candidate for the study of land cover and land use change, containing as it does a history of drivers both natural and human. We have used remote sensing imagery taken from 1956 onwards, in concert with neural network methods, to carry out two tasks: (1) to investigate the possibility of mapping land cover from remote sensing imagery, in particular greyscale aerial photography; (2) to develop a model of land cover change using natural and human drivers from known historical land cover maps.



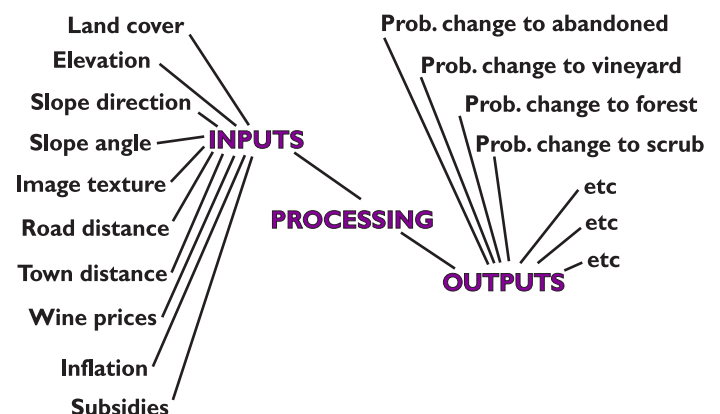
Training areas were selected using local knowledge, and used to train a neural network based on textural measurements of the greyscale image. Accuracy measurement using known land cover maps from 1986, 1998 and 2003 show that this method of land cover mapping is of limited use. Problems include image contrast inconsistency across a mosaic of images and differences in image quality over the time period investigated. However, the system is capable of providing broad classification between forest, cultivated and vineyard land cover types.

## BASIC FACTS

- Vineyards present since 12th century
- Monoculture by end of 19th century
- Overproduction and phylloxera led to abandonment and recultivation
- Particular biophysical properties of region restrict vineyard productivity (high stoniness, steep slopes, low soil fertility, low annual rainfall)
- 1990s – market boom in wine
- New terracing technology
- Rapid and uncontrolled change in land use and land cover
- Soil properties and landscape experiencing rapid change



Neural networks function as a method of understanding complex data sets. Input data is fitted to output data using hidden internal nodes, with the connection weightings allowing complex functions to be developed.



## LAND COVER CHANGE MODEL

We are developing a neural network model to predict land cover change which includes biophysical properties of the landscape (current land cover, topography), aerial photography texture measurement and socioeconomic variables (distance to roads and towns, wine market prices, inflation, subsidies). These will be used to create a nonlinear model predicting the yearly probability of change from one land cover type to another. This model will then be implemented within a cellular automaton to provide scenario simulations of land cover change in the Priorat region.