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AUTOMATIC COMPUTER-BASED DIAGNOSIS IN ACUTE ABDOMINAL PAIN

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BACKGROUND

In a project initiated in Mora in 1997 [3], 3 337 patients were examined using a standardised form consisting of some 55 different parameters, ranging from current pain localization to various blood measurements, describing the patient's history and status. The same patients were later followed up to determine the final diagnosis. Here, we report on our first findings using this material for studies on computer-based diagnosis of acute abdominal pain.

METHODS

Before using the collected data these were first transformed to a homogeneous format and the resulting dimensionality was 127. Missing data were substituted with the use of estimated normal ("healthy") values.

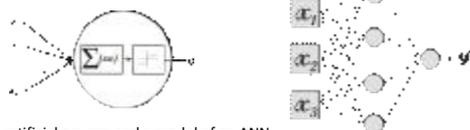


Figure 1: An artificial neuron and a model of an ANN

Our trials with linear networks, using softmax output and six categories (diagnose groups), performed almost as well as the doctors. Following trials with non-linear networks showed no convincing results.

Support vector machines (SVMs) are a type of classification algorithms and the SVM model is trained by adapting its weights to the data at hand. The area under the receiver operating characteristic curve (AUC) was used to measure performance.

RESULTS

In this poster we present our latest preliminary results using the one-against-all and one-against-one approach.

Table 1: Summary of performance results for the diagnosis of diverticulitis and non-specific abdominal pain (NSAP): sensitivity/specificity.

| | Diverticulitis vs others | NSAP vs others | Diverticulitis vs NSAP |
|--------------------------|--------------------------|----------------|------------------------|
| Sensitivity | 0.714 307 | 0.714 309 | 0.7141 461 |
| Specificity | 0.5714 090 | 0.4285 070 | 0.7140 905 |
| Area under the ROC curve | 0.500 087 | 0.410 009 | 0.7860 353 |

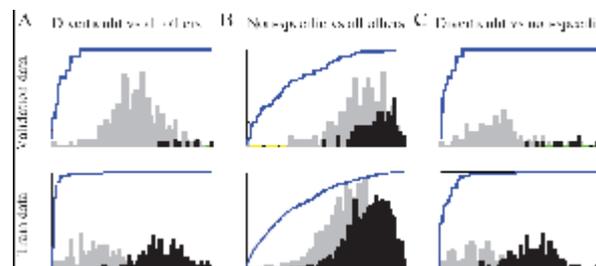


Figure 2: Histograms illustrating the separability of:
A) Diverticulitis (black) vs. all other diseases (grey)
B) Non-specific abdominal pain (black) vs. all other diseases (grey)
C) Diverticulitis (black) vs. non-specific abdominal pain (grey)

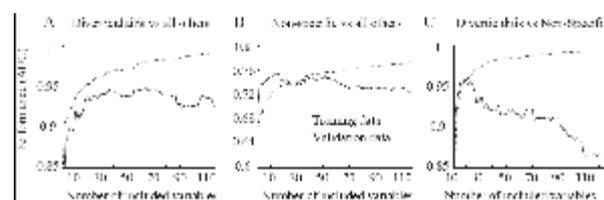


Figure 3: Performance as a function of the number of included variables for:
A) Diverticulitis vs. all other diseases
B) Non-specific abdominal pain vs. all other diseases
C) Diverticulitis vs. non-specific abdominal pain

CONCLUSION

Automatic computer-based disease classification is a promising tool for the diagnosis of acute abdominal pain, but requires substantial research before a clinical implementation is feasible.

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