Alzheimer disease (AD) is the most frequent dementia. The prevalence is approximately 10% in 65 years old people. The current treatment is only progression protective, therefore it is crucial to find a new diagnostic approach for diagnosing AD in early stage. We analysed a set of 55 patients by the drop coating deposition Raman spectroscopy with the goal to verify previously published high sensitivity of the AD spectroscopic diagnosis in cerebral spinal fluid (CSF) and to find a new diagnostic method for blood serum (BS). We optimized measurement conditions for BS. The results were evaluated by the cluster analysis and the principal component analysis. The small set of samples exhibited high sensitivity in both CSF and BS but that distinctly decreased in the whole set. The results for CSF were affected by the choice of the analysed spectral interval. The best for AD diagnose was the interval containing peaks at 980, 1080 and 1249 cm–1.The results for BS have been the most sensitive in the whole spectral range. They have low sensitivity but high specificity for AD (92%). The usage of neural networks has conversely high sensitivity and low specificity in both sets of samples of BS and CSF.