Advanced Methods of Data Analysis: Normalizing Flows

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In this paper, the expressiveness of fully connected neural networks is used in a class of transformation known as normalizing flows in order to construct density estimator. Further these estimators are utilized to classify stars.

more explizit

I. INTRODUCTION

Normalizing flows is a powerfull method that utilizes the transformation of random variables for either density estimation or for generativ sampling.

II. THEORY

A. functions of random variables

To estimate the density distribution we make use of the formula of transformations of random variables.

Let z be a random variable distributed as $r(z)$ then a random variable $x = f(z|\theta)$, where f is a invertible differentiable function with parameters θ, is distributed as $q(x)$ with:

$$q(x) = r(z)\left|\frac{\mathrm{d}z}{\mathrm{d}x}\right| = r(z)\left|\det J_f(z)\right|^{-1}$$

We call $r(z)$ the base distribution and $q(x)$ the target distribution.

To get a density estimation of data x' with some features we would vary θ until $q(x)$ is close to the target distribution of the data, then we could compute $r(f^{-1}(x'|\theta))\left|\det J_f(x'|\theta)\right|$ which is the estimate for the probability of the data. To do this we have to be able to compute the inverse transformation, its Jacobian determinant and evaluate the base distribution.

citation

B. parameterize the transformation

C. training the transformation

III. METHODS

IV. NORMALIZING FLOW CATEGORIES

V. RESULTS

VI. SUMMARY

VII. CONCLUSION

want to classify and density estimation

Dataset erklären

classifier by density estimation

how f parametrized

DKL

wie classifier bzw. was für auswertungen

training erklären

wie classifier

quellen raussuchen bzw. hier verweisen