NONPARAMETRIC METHODS IN ECONOMETRICS (FALL 2012)

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1. Objective

The objective of this short course is to familiarize students with the theoretical and practical aspects of some nonparametric methods and techniques that are used in estimating and testing a large class of econometric models.

2. Content

Broadly speaking, I plan to cover the following topics:

1. Quick review of essential pre-requisites.
   - What is a model?
   - Differences between parametric, semiparametric and fully nonparametric models.
   - The need for nonparametric estimators.
   - Basic asymptotic theory relevant for this course.
2. Nonparametric estimation by the method of kernels.
   - Density estimation.
   - Nonparametric regression.
   - Consistency and asymptotic normality.
   - Statistical inference.
3. Implementation issues.
   - Choosing bandwidths by cross-validation.
   - Incorporating discrete and continuous regressors.
   - Boundary effects related to kernel estimators.
   - Computer code.
4. Other estimation methods.
   - Local polynomial estimators.
   - Series estimators.
5. Specification testing of densities and regression functions.
6. Applications to semiparametric models.
   - Partially linear regression.
   - Estimating index models.
   - Estimating average derivatives.
   - Sample selection models.
   - General conditional moment restriction models (time permitting).
7. Nonparametric regression with endogenous regressors (time permitting).

3. References

The following is a very brief list of some books and papers that contain material relevant for us. Additional references will be given in class as the course progresses.

1. Books.
   - *Applied nonparametric regression*, W. Härdle, 1989.
   - *Local polynomial modelling and its applications*, J. Fan and I. Gijbels, 1996.
   - *Nonparametric smoothing and lack-of-fit tests*, J. D. Hart, 1997.
   - *Nonparametric econometrics*, A. Pagan and A. Ullah, 1999.
   - *Nonparametric econometrics: Theory and practice*, Q. Li and J. Racine, 2006.
   - *Semiparametric and nonparametric methods in econometrics*, J. L. Horowitz, 2009.
2. Papers.
   - *Kernel estimators of regression functions*, H. J. Bierens, *Proceedings of the Fifth International Symposium in Economic Theory and Econometrics*, 1985.
   - *Asymptotically efficient estimation in the presence of heteroskedasticity of unknown form*, P. M. Robinson, *Econometrica*, pp. 875–891, vol. 55, 1987.
   - *Root-N-consistent semiparametric regression*, P. M. Robinson, *Econometrica*, pp. 931–954, vol. 56, 1988.
   - *Semiparametric estimation of index coefficients*, J. L. Powell, J. H. Stock, and T. M. Stoker, *Econometrica*, vol. 57, pp. 1403–1430, 1989.
   - *Nonparametric policy analysis*, J. H. Stock, *JASA*, vol. 84, pp. 567–575, 1989.
   - *Investigating smooth multiple regression by the method of average derivatives*, W. Härdle and T. M. Stoker, *JASA*, vol. 84, pp. 986–995, 1989.
   - *An efficient semiparametric estimator for binary response models*, R. W. Klein and R. H. Spady, *Econometrica*, vol. 61, pp. 387–421, 1993.
   - *Comparing nonparametric versus parametric regression fits*, W. Härdle and E. Mammen, *Annals of Statistics*, vol. 21, 1926–1947, 1993.
   - *Applied nonparametric methods*, W. Härdle and O. Linton, *Handbook of Econometrics*, vol. 4, 1994.
   - *Estimation of semiparametric models*, J. L. Powell, *Handbook of Econometrics*, vol. 4, 1994.
   - *Large sample estimation and hypothesis testing*, W. K. Newey and D. McFadden, *Handbook of Econometrics*, vol. 4, 1994.
   - *A consistent test of functional form via nonparametric estimation techniques*, J. X. Zheng, *Journal of Econometrics*, vol. 75, pp. 263–289, 1996.
   - *Kernel regression in empirical microeconomics*, R. Blundell and A. Duncan, *Journal of Human Resources*, vol. 33, pp. 62–87, 1998.
   - *Household gasoline demand in the United States*, R. Schmalensee and T. M. Stoker, *Econometrica*, pp. 645–662, vol. 67, 1999.
   - *Two-step series estimation of sample selection models*, W. K. Newey, *Econometrics Journal*, vol. 12, pp. 217–229, 2009.