Povzetek

V diplomskem delu obravnavam model vektorske avtoregresije (VAR), ki je med najbolj uporabljenimi metodami pri analizi časovnih vrst, in stabilne slučajne procese. V prvem razdelku so predstavljeni stabilni vektorski avtoregresivni procesi in napovedovanje z njimi. Pri analizi z vektorsko avtoregresijo je obravnavana večrazsežna časovna vrsta generirana z nekim VAR slučajnim procesom. Če časovna vrsta 'niha' znotraj majhnega intervala okoli svojega povprečja, pravimo, da je časovna vrsta stabilna in pripadajoči VAR proces je stabilen. Napoved zelo težko izpeljemo v zaključeni obliki, zato se omejimo na nek razred napovedi in v tem razredu poiščemo optimalno napoved. Če izberemo razred linearnih napovedi, iščemo optimalno linearno napoved z minimalnim povprečnim kvadratom napake. V drugem razdelku opisujem ocenjevanje stabilnih VAR procesov in napovedovanje z ocenjenim procesom. Pri ocenjevanju se najbolj uporablja metoda najmanjših kvadratov, saj imajo cenilke parametrov stabilnega VAR procesa, dobljene po tej metodi, dobre asimptotične lastnosti: so konsistentne, nepristranske in imajo asimptotično normalno porazdelitev. Če je prvotni proces normalno porazdeljen, bodo tudi napovedi z ocenjenimi parametri normalno porazdeljene. V tretjem razdelku je predstavljen primer ocenjevanja in napovedovanja z VAR modelom

Ključne besede: časovne vrste, vektorski avtoregresivni procesi, napovedovanje, metoda najmanjših kvadratov, povprečni kvadrat napake, napovedna napaka

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Abstract

Vector autoregression (VAR) method is frequently used for a time series analysis. The method presumes that a multiple time series is generated by some stochastic VAR process. If a time series fluctuates tightly around the process' mean, it is stable and the underlying data generating process is stable. Every stable VAR process is stochastic. Although the stability of process is not common in practice, a lot of unstable processes can be transformed into stable ones with a proper procedure. The main use of VAR method is forecasting. An optimal prediction is a prediction with minimal mean squared error, made by forecasting. Important class of prediction estimators is the class of linear estimators. The linear minimum mean squared error estimator is the estimator that achieves the minimal mean squared error among all linear estimators. If VAR model's parameters are unknown, estimate of the parameters has to be calculated. Widely used method for parameter's estimation is the least square method. Its main advantages when used on a stable VAR process are good asymptotic properties of the obtained estimators - they are consistent, unbiased and asymptoticaly normally distributed. If the original process is normally distributed, it follows that the predictions with estimated parameters are normally distributed.

Key words: time series, vector autoregression process, forecasting, least square method, mean squared error, forecast error

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