雷達適應性資料結合及gating技術研究=radar adaptive data association algorithm and gating technique research

陳世峰、鍾翼能

E-mail: 9019867@mail.dyu.edu.tw

摘 要

目標的判定在雷達追蹤系統上佔極重要的地位，而其中以資料相關性結合（Data Association Algorithm）之數學運算程序為最主要的處理技術。在多目標追蹤環境中，由於複雜的地形天候及雜訊的干擾，雷達感測器所收到的訊號中，除了正確的目標量測值外，常常包含各種雜訊，造成錯誤的資料相關結合，進而引起追蹤上的誤差，甚至導致追蹤失敗。 本論文結合資料相關性結合技術與適應性Gating技術，來改善追蹤系統的精確度和控制雷達追蹤的區域在一個範圍以內，避免系統追蹤過多的觀測值造成系統過載，讓雷達追蹤系統(Radar tracking system)能更有效的掃描追蹤目標的資訊。其主要架構為追蹤系統在目標發生變速度(Maneuvering)運動時，改變所接收之目標運動狀態資料的Gating大小，減少系統運算的時間，以求在最短的時間內蒐集到完整的資訊，並在最短的時間內修正追蹤目標的軌跡(Track)，減少預測的誤差。

關鍵詞 : 適應性Gating技術 ; 雷達追蹤系統

目錄

參考文獻

1. R.A. Singer, ” Estimating Optimal Tracking Filter Performance for Manned Maneuvering Targets, ” IEEE Trans. On Aerosp. and Electron. Syst., Vol. AES-5, pp. 473-483, July 1970. 2. R. A. Singer, and K.W. Behnke, ” Real-Time Tracking Filter Evaluation and Selection for Tactical Applications, ” IEEE Trans. on Aerosp. and Electron. Sys., Vol. AES-7, No.1, pp. 100-110, March 1970. 3. Bar-Shalom, Y. , ” Tracking Methods in a Multi-Target Environment, ” IEEE Trans. Automa. Contr. , Vol., AC-23, pp. 618-626, Aug.1978. 4. Reid, D. B., “ An Algorithm for Tracking Multiple Targets, ” IEEE Trans. Automa. Contr., Vol. AC-24, pp. 843-854, Dec. 1979. 5. B.D.O. Anderson , and J.B. Moore, ” Optimal Filtering, ” Pretice Hall Inc., 1979. 6. Y. Bar-Shalom and T. Edsion, “ Sonar Tracking of Multiple Targets Using Joint Probabilistic Data Association, ” IEEE Journal of Oceaning Engineering, Vol. OE-8, No.3, 1983. 7. Hovanessian, S. A., “ Radar System Design and Analysis, “ Artech House, Inc., 1984. 8. A.Farine, and F. A. Studer, “ Radar Data Processing, ” Research Studies Press Ltd., 1985. 9. Chang, K. C., Chong, C.Y., and Bar-Shalom, Y., “ Joint Probabilistic Data Association in Distributed Sensor Networks, ” IEEE Trans. Automa. Contr., Vol. AC-31, pp. 889-897, Oct. 1986. 10. Y. Bar-Shalom, and T.E. Formann, “ Tracking and Data Association, ” Artech House,1988. 11. E. Emre, and J. Seo, ” A Unifying Approach to Multi-Target Tracking , ” IEEE. Trans. Aerosp. Electron. Syst., Vol. AES-25, pp. 520-528, 1989. 12. Y.N. Chung, D.L. Gustafson, and E. Emre, “ Extended Solution to Multiple Maneuvering Target Tracking, ” IEEE Trans. Aerosp. Electron. Syst. Vol.

AES-25, pp.876-887,1990. 13. S. Haykin, “ Adaptive Filter Theory, ” Prentice-Hall Inc.1991. 14. Byron, Eddle., “ Radar Principles, Technology, Applications, ” Prentice-Hall Inc. 1993. 15. R.L.Popp,K.R.Pattipati,Y.Bar-Shalom&M.Ysddanapudi , "Parallelization of a Multiple Tracking Algorithm with Superlinear Speedups,"IEEE Trans. Aerosp. Electron. Syst. Vol AES-33 , pp.281-290,1997.3 16. S-T.Park&J.G.Lee, ” Design of a Practical Tracking Algorithm with Radar Measurements, ” IEEE Trans. Aerosp. Electron. Syst. Vol AES-34,pp.1337-1345,1998. 17. E.Mazor,J Dayan,A.Averbuch &Y.Bar-Shalom, ” Interacting Multiple Model Methods in Target Tracking: A Survey, ” IEEE Trans.Aerosp.Electron. Syst. Vol AES-34,pp.103-124,1998. 18.Anderson, B.D.O and J.B. Moore, Optimal filtering, Prentice-Hall, Englewood Cliffs, NJ(1979). 19.Bar-Shalom, Y. and T.E. Fortmann, Tracking and Data Association Press, San Diego, CA(1988). 20.Blackman, S.S., Multi-Target Tracking with Radar Applications, Artech-House, Norwood, MA(1986). 21.Chang, K.C. and Y. Bar-Shalom, “ Joint Probabilistic Data Association for Multi-target Tracking with possibly Unresolved Measurements and Maneuvers, “ IEEE Trans.Automat. Contr., Vol. AC-29, No.7 pp. 585-594 (1984). 22.Chang, C.B. and J.A. Tabaczynki, “ Application of State Estimation to Target Tracking, ” IEEE Trans. Automat. Contr., Vol. AC-29, pp. 98-109 (1984). 23.Chung, Y. N., D.L.Gustafson and E.Emre, “ Extended Solution to Multiple Maneuvering Target Tracking, ” IEEE Trans. Aerosp. Electron. Syst., Vol. 26,No. 5, pp. 876-887 (1990). 24.Farian, A. and F.A. Studer, Radar Data Processing, Vol. 1-Introduction and Tracking,Research Studies Press, England (1985). 25.Lin, C.F., Modern Navigation Guidance, and Control Processing, Prentice-Hall,Englawood Cliffs, NJ (1991). 26.Roecker, J.A. and C.D. McGillem, “ Target Tracking in Maneuver Centered Coordinates, “ IEEE Trans. Aerosp. Electron. Syst., Vol. 25, No.6 pp. 836-843 (1989).