

基于 SVR 的军用装备软件可靠性模型研究

马振宇¹, 张威¹, 吴纬², 刘福胜¹, 高飞³

(¹ 装甲兵工程学院, 北京 100072; ² 北京特种车辆研究所, 北京 100072; ³ 中国人民解放军 95942 部队, 湖北 武汉 430300)

摘要: 在软件可靠性建模时, 有效的提高可靠性的预测精度, 对于指导可靠性测试, 提高军用装备软件可靠性具有十分重要的作用. 从特种车辆软件测评中心收集了相关数据. 将支持向量回归算法应用到军用装备软件的可靠性模型中, 并与 13 种其他机器学习算法模型进行比较. 结果表明 SVR 算法提高了军用软件可靠性预测准确率, 分别在均方根误差、平均绝对误差、相对平方根误差、相对绝对误差这四个方面体现出来.

关键词: 可靠性测试; 缺陷密度; SVR; 可靠性预测

Research on Military Equipment Software Reliability Model Based on SVR

MA Zhen-yu¹, ZHANG Wei¹, WU Wei², LIU Fu-sheng¹, GAO Fei³

(¹ Academy of Armored Force Engineering, Beijing 100072, China; ² Beijing Special Vehicle Research Institute, Beijing 100072, China; ³ Unit 95942 of PLA, Wuhan 430300, China)

Abstract: In the process of software reliability modeling, it is very important to effectively improve the prediction accuracy of reliability, which can guide the reliability test and improve the reliability of military equipment software. Related data is collected from Special Vehicles Software Assessment Center. It applies support vector regression to military equipment software reliability model and compare to other machine learning algorithms model. The result illustrates that the SVR algorithm can improve the accuracy of military software reliability prediction, which is reflected in the following four aspects: root mean square error、mean absolute error、root relative square error、relative absolute error.

Key words: reliability testing; defect density; SVR; reliability prediction

作者简介:

马振宇男, (1991-), 博士研究生. 研究方向为软件可靠性、可靠性验证测试、软件测试. E-mail: 625181316@qq.com.

张威男, (1968-), 博士, 教授. 研究方向为软件工程、软件测试、军用软件保障.

吴纬男, (1962-), 博士, 高级工程师. 研究方向为装备全寿命、可靠性增长.

刘福胜男, (1975-), 博士, 副教授. 研究方向为装备保障.

高飞男, (1990-), 硕士. 研究方向为军事信息系统、软件测试.