1. Record Nr. UNINA9910299564303321

Autore	Chaudhuri Subhasis
Titolo	Kinesthetic Perception : A Machine Learning Approach / / by Subhasis Chaudhuri, Amit Bhardwaj
Pubbl/distr/stampa	Singapore : , : Springer Singapore : , : Imprint : Springer, , 2018
ISBN	981-10-6692-2
Edizione	[1st ed. 2018.]
Descrizione fisica	1 online resource (XV, 138 p. 50 illus., 44 illus. in color.)
Collana	Studies in Computational Intelligence, , 1860-949X ; ; 748
Disciplina	004.77
Soggetti	Robotics Automation Artificial intelligence Control engineering Robotics and Automation Artificial Intelligence Control and Systems Theory
Lingua di pubblicazione	Inglese
Formato	Materiale a stampa
Livello bibliografico	Monografia
Nota di contenuto	Intro -- Preface -- Acknowledgements -- Contents -- About the Authors -- 1 Introduction -- 1.1 Basics of Haptics -- 1.1.1 Various Research Areas in Haptics -- 1.1.2 Possible Applications -- 1.2 Kinesthetic Perception -- 1.3 Perception: Aware Engineering Design -- 1.4 Organization of the Book -- References -- 2 Perceptual Deadzone -- 2.1 Haptic Data Compression -- 2.2 Perceptual Deadzone for Multidimensional Signals -- 2.3 Effect of Rate of Change of Kinesthetic Stimuli -- References -- 3 Predictive Sampler Design for Haptic Signals -- 3.1 Introduction -- 3.2 Experimental Setup -- 3.2.1 Device Setup -- 3.2.2 Signal Characteristics -- 3.2.3 Lag in User Response -- 3.2.4 Collected Data -- 3.3 Classification of Haptic Response -- 3.3.1 Performance Metric -- 3.3.2 Weber Classifier -- 3.3.3 Level Crossing Classifier -- 3.3.4 Classifiers Based on Decision Tree and Random Forests -- 3.3.5 Effect of Temporal Spacing -- 3.3.6 Significance Test for Classifiers -- 3.4 Applications in Adaptive Sampling -- References -- 4 Deadzone Analysis of 2-D Kinesthetic Perception -- 4.1 Introduction -- 4.2 Experimental Setup -- 4.2.1 Signal Characteristics

and User Response -- 4.2.2 Data Statistics -- 4.3 Determination of Perceptual Deadzone -- 4.3.1 The Weber Classifier -- 4.3.2 Level Crossing Classifier -- 4.3.3 Elliptical Deadzone -- 4.3.4 Oriented Elliptical Deadzone -- References -- 5 Effect of Rate of Change of Stimulus -- 5.1 Introduction -- 5.2 Design of Experiment -- 5.2.1 Kinesthetic Force Stimulus -- 5.2.2 Data Collection -- 5.3 System Correction -- 5.4 Estimation of Decision Boundary -- 5.4.1 Parametric Decision Boundary -- 5.4.2 Nonparametric Decision Boundary -- 5.5 Analysis of Results -- References -- 6 Temporal Resolvability of Stimulus -- 6.1 Introduction -- 6.1.1 Motivation for the Study -- 6.1.2 Related Work -- 6.1.3 Our Approach.
6.2 Experimental Setup -- 6.2.1 Signal Characteristics -- 6.2.2 Data Collection -- 6.3 Estimation of Temporal Resolution -- 6.4 Effect of Fatigue -- 6.5 Application in Data Communication -- References -- 7 Task Dependence of Perceptual Deadzone -- 7.1 Introduction -- 7.1.1 Objective of the Study -- 7.1.2 Prior Work -- 7.1.3 Our Approach -- 7.2 Design of Experiment -- 7.2.1 Kinesthetic Force Stimulus -- 7.2.2 Data Statistics -- 7.3 Estimation of Perceptual Deadzones -- References -- 8 Sequential Effect on Kinesthetic Perception -- 8.1 Introduction -- 8.2 Sequential Effect -- 8.3 Quantification of Sequential Effect -- 8.3.1 Logistic Regression -- 8.3.2 Description of the Regression Model -- 8.4 Analysis of Effect on Comparative Task -- 8.5 Analysis of Effect on Discriminative Task -- References -- 9 Conclusions -- Index.

Sommario/riassunto

This book focuses on the study of possible adaptive sampling mechanisms for haptic data compression aimed at applications like tele-operations and tele-surgery. Demonstrating that the selection of the perceptual dead zones is a non-trivial problem, it presents an exposition of various issues that researchers must consider while designing compression algorithms based on just noticeable difference (JND). The book begins by identifying perceptually adaptive sampling strategies for 1-D haptic signals, and goes on to extend the findings on multidimensional signals to study directional sensitivity, if any. The book also discusses the effect of the rate of change of kinesthetic stimuli on the JND, temporal resolution for the perceivability of kinesthetic force stimuli, dependence of kinesthetic perception on the task being performed, the sequential effect on kinesthetic perception, and, correspondingly, on the perceptual dead zone. Offering a valuable resource for researchers, professionals, and graduate students working on haptics and machine perception studies, the book can also support interdisciplinary work focused on automation in surgery.