

# Contents

- 1 An Introduction to the Geometry of Agent Knowledge .....1**
  - 1.1 Introduction.....1
  
- 2 Tensor Calculus and Formal Concepts.....5**
  - 2.1 Vectors and Superposition of Attributes .....5
  - 2.2 Invariants ..... 14
  
- 3 Geometry and Agent Coherence .....31**
  - 3.1 Agents and Coherence .....33
  - 3.2 Field, Neural Network Geometry and Coherence .....38
  - 3.3 Transformations in Which the General Quadratic Form Is Invariant .....47
    - 3.3.1 Geometric Psychology and Coherence .....50
  - 3.4 Local and Global Coherence Principle .....54
  
- 4 Field Theory for Knowledge .....61**
  - 4.1 Introduction.....61
  - 4.2 Field of Conditional Probability and Tensor Image .....61
  - 4.3 Geometry of Invariance and Symmetry in Population of Neurons by QMS (Quantum Morphogenetic System) .....66
    - 4.3.1 Introduction ..... 66
    - 4.3.2 Invariants and Symmetry..... 71
  - 4.4 Retina Model and Rotation Symmetry.....76
    - 4.4.1 Sources and Transformations in Diffusion Reaction Equation ..... 78
    - 4.4.2 Computational Experiments by Loo Chu Kiong [ ] ..... 80
    - 4.4.3 Conclusion..... 82
  - 4.5 Quantum Mechanics and Non Euclidean Geometry .....82
    - 4.5.1 Introduction ..... 82
    - 4.5.2 Introduction to the Problem..... 82
    - 4.5.3 Hopfield Net and Quantum Holography by Morphogenetic System in Euclidean Geometry ..... 83
    - 4.5.4 Hopfield Net and Quantum Holography by Morphogenetic System in Non Euclidean Geometry ..... 87
    - 4.5.5 Computational Experiments by Professor Loo Chu Kiong .... 90

4.5.6	Conclusions .....	92
4.6	Superposition of Basis Field and Morphogenetic Field .....	92
4.6.1	Objectives and Principles .....	93
4.6.2	Example of Elementary Morphogenetic Field and Sources ...	96
4.6.3	Example of DATA as Morphic Fields and Sources .....	98
4.6.4	What Is Data Mining? .....	100
4.6.5	Second Order Data Mining.....	101
4.7	Example of Computation of Sources of Fields .....	102
	References .....	105
<b>5</b>	<b>Brain Neurodynamic and Tensor Calculus .....</b>	<b>107</b>
5.1	Properties and Geometry of Transformations Using Tensor Calculus.....	107
5.2	Derivative Operator in Tensor Calculus and Commutators .....	115
5.3	Neurodynamic and Tensor Space Image.....	123
5.4	Introduction.....	123
5.5	Constrains Description by States Manifold. [18] .....	124
5.6	Metric Tensor and Geodesic in the Space of the States $x$ .....	125
5.7	Ordinary Differential Equation (ODE) in the Independent Variables by Geodesic.....	127
5.8	Geodesic in Non Conservative Systems .....	129
5.9	Amari [26] Information Space and Neurodynamic .....	131
5.10	Electrical Circuit, Percolation and Geodesic [19].....	133
5.11	Neural Network Geodesic in the Space of the Electrical Currents [24][25] .....	135
5.12	Toy Example of Geodesic and Electrical Circuit.....	135
5.12.1	Membrane Electrical Activity and Geodesic.....	137
5.13	Relation between Voltage Sources and Currents .....	145
5.14	Geodesic in Presence of Voltage-Gated Channels in the Membrane .....	145
5.15	Geodesic Image of the Synapses and Dendrites.....	148
5.16	Geodesic Image of Shunting Inhibition .....	151
5.17	Example of Implementation of Wanted Function in the CNS System.....	151
5.18	Conclusion .....	152
	References .....	153
	Appendix A.....	155
<b>6</b>	<b>Electrical Circuit as Constrain in the Multidimensional Space of the Voltages or Currents.....</b>	<b>159</b>
6.1	Geometry of Voltage, Current, and Electrical Power .....	159
6.1.1	Geometric Representation of the EC .....	163
6.1.2	Electrical Power as Logistic Function in the Voltages $m$ Dimensional Space.....	168

6.1.3	Classical Parallel and Series Method to Compute Currents and Geometric Method .....	170
6.2	A New Method to Compute the Inverse Matrix .....	175
6.3	Electrical Circuit and the New Method for Inverse of the Matrix .....	185
6.4	Transistor and Amplifier by Morphogenetic System .....	191
6.5	Discussion .....	204
	References .....	205
<b>7</b>	<b>Superposition and Geometry for Evidence and Quantum Mechanics in the Tensor Calculus .....</b>	<b>207</b>
7.1	Introduction .....	207
7.2	Evidence Theory and Geometry .....	207
7.3	Geometric Interpretation of the Evidence Theory .....	209
7.4	From Evidence Theory to Geometry .....	218
7.5	Quantum Mechanics Interference and the Geometry of the Particles .....	220
7.6	Conclusion .....	228
	References .....	228
<b>8</b>	<b>The Logic of Uncertainty and Geometry of the Worlds .....</b>	<b>229</b>
8.1	Introduction .....	229
8.2	Modal Logic and Meaning of Worlds .....	233
8.3	Kripke Modal Framework .....	233
8.4	Definitions of the Possible Worlds .....	234
8.5	Meaning of the Possible World .....	235
8.6	Discussion of Tarski's Truth Definition .....	237
8.7	Possible World and Probability .....	240
8.8	Break of Symmetry in Probability Calculus and Evidence Theory by Using Possible Worlds .....	242
8.9	Fuzzy Set Theory .....	249
8.9.1	Modified Probability Axioms Approach .....	249
8.9.2	Fuzzy Logic Situations .....	252
8.10	Context Space Approach .....	257
8.11	Comparison of Two Approaches .....	259
8.12	Irrational World or Agent .....	259
8.13	Fuzzy Set, Zadeh Min Max Composition Rules and Irrationality .....	261
8.14	Irrational and Rational Worlds .....	264
8.15	Mapping Set of Worlds .....	266
8.16	Invariant Expressions in Fuzzy Logic .....	268
8.17	Linguistic Context Space of the Worlds .....	269
8.18	Economic Model of Worlds .....	274
8.19	Irrational Customers and Fuzzy Set .....	276
8.20	Communication among Customers and Rough Sets .....	277
8.21	Conclusion .....	278
	References .....	278