Summary: Part 3

Tianpei Xie

$Jan.\ 26th.,\ 2023$

Contents

1	\mathbf{App}	Applications		
	1.1	U-Statistics	2	
	1.2	Kernel-Density Estimation	2	
	1.3	Random Graph	2	
	1.4	Minimum Weight Spanning Tree	2	
	1.5	Rademacher Complexity	2	
	1.6	Dimensionality Reduction	2	
2	Self	E-Bounding Functions	2	
	2.1	Definitions, Variance Bounds and Concentration	2	
	2.2	Configuration Function	2	
	2.3	VC-Dimension and Growth Function	2	
	2.4	Longest Increasing Subsequence	2	
	2.5		2	
3	Random Matrices			
	3.1	Definitions	2	
	3.2	Concentration Inequalities of Random Vectors	2	
	3.3	Concentration of Norm of Gaussian Vectors	2	
	3.4	Spectral Distribution of Hermitian Matrix: Semi-Circular Law	2	
	3.5	Largest Eigenvalue of Hermitian Random Matrix	2	
4	Em	pirical Process	2	
	4.1	Definition	2	
	4.2		2	
	4.3	9	2	
	4.4	•	2	
	4.5		2	
	4.6		$\frac{1}{2}$	
	17		2	

1 Applications

- 1.1 U-Statistics
- 1.2 Kernel-Density Estimation
- 1.3 Random Graph
- 1.4 Minimum Weight Spanning Tree
- 1.5 Rademacher Complexity
- 1.6 Dimensionality Reduction
- 2 Self-Bounding Functions
- 2.1 Definitions, Variance Bounds and Concentration
- 2.2 Configuration Function
- 2.3 VC-Dimension and Growth Function
- 2.4 Longest Increasing Subsequence
- 2.5 Weakly Self-Bounding Functions
- 3 Random Matrices
- 3.1 Definitions
- 3.2 Concentration Inequalities of Random Vectors
- 3.3 Concentration of Norm of Gaussian Vectors
- 3.4 Spectral Distribution of Hermitian Matrix: Semi-Circular Law
- 3.5 Largest Eigenvalue of Hermitian Random Matrix
- 4 Empirical Process
- 4.1 Definition
- 4.2 Uniform Law of Large Numbers
- 4.3 Suprema of Gaussian Process
- 4.4 Covering Number, Packing Number and Metric Entropy
- 4.5 Chaining