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CONTENTS

Abstract: This work considers the consensus of multi-agent networks, wherein agents' states agree on the dynamics governed by the random-walk normalised Laplacian matrix. The interaction topology of the network is assumed to be time-invariant, undirected, with communication link weights set to unity. The dynamics are defined over a continuous time interval. Within the network, certain agents are designated as sensors, possessing a complete priori known states. The rest of the agents are non-sensors, with entirely unknown states. The objective of this study is to investigate the accurate retrieval of complete internal states of non-sensors, a challenge known as the observability problem. We propose a range of necessary and sufficient conditions based on spectral characterisation, including matrix-rank criteria, for evaluating observability. While some presented results are necessary but not sufficient for observability, others are sufficient but not necessary. Our analysis employs tools from algebraic graph theory and spectral techniques. Proposed findings are validated through illustrative examples. Inference diagrams elucidate the communication flow between sensors and non-sensors, offering deeper insights into observability analysis. We provide an illustrative example of a network where after verifying its observability behaviour, we accurately recollected the complete internal states of its non-sensors. This example also highlights the general observation that using partial knowledge of sensors' states may lead to inaccurate non-sensors' states recovery. Furthermore, we derive a formula to compute the minimum number of sensors required to ensure network observability. In essence, this work contributes to understanding observability challenges and underscores the crucial role of sensor distribution in multi-agent network dynamics.

Abstract: Let X, Y be two subspaces of summability domains of matrices with real or complex entries defined by speeds of convergence, i.e. by monotonically increasing positive sequences λ and μ. In this paper, we define the notion of absolute summability with speed, and give necessary and sufficient conditions for a matrix M (with real or complex entries) to map X into Y, where X is the subspace of summability domain of

a reversible or a normal matrix A, consisting of sequences, absolutely A-summable with speed λ, and Y is the subspace of the summability domain of a triangle matrix B defined by the speed μ. As an application, we consider the case when A is the Riesz matrix (R, p_n).

Abstract: This paper presents a study on intuitionistic fuzzy bitopological spaces by introducing and examining a range of innovative concepts. Firstly, we introduce intuitionistic fuzzy-(i, j)-regular open (closed) sets, which possess significant characteristics within these spaces. Additionally, we define and investigate intuitionistic fuzzy-(i, j)-almost open (closed) mapping, intuitionistic fuzzy-(i, j)-almost continuous mappings, intuitionistic fuzzy-(i, j)-weakly open (closed) mapping, and intuitionistic fuzzy-(i, j)-weakly continuous mapping. The study delves into the notable properties and implications of these sets and mappings in intuitionistic fuzzy bitopological spaces.

Abstract: The aim of this paper is to establish fixed point results for a single mapping satisfying certain contraction conditions and to prove a common fixed point theorem for two mappings satisfying generalized (ψ, ϕ) −weak contractive condition in Modular b-metric space.

Abstract: We study the third fundamental form III of an interesting class of surfaces in the 3-dimensional Euclidean space E^3 namely,the translation surfaces. Firstly we present some useful results of this class in the Euclidean 3-space. Then we introduce the general concept of surfaces of finite type. Finally, we conclude that Sherk's surface is the only translation surface of finite III-type.

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