

A CONSTRUCTIVE EXTENSION OF THE CHARACTERIZATION ON POTENTIALLY $K_{s,t}$ -BIGRAPHIC PAIRS¹

JI-YUN GUO AND JIAN-HUA YIN²

*Department of Mathematics
College of Information Science and Technology
Hainan University, Haikou 570228, P.R. China*

e-mail: yinjh@hainu.edu.cn

Abstract

Let $K_{s,t}$ be the complete bipartite graph with partite sets of size s and t . Let $L_1 = ([a_1, b_1], \dots, [a_m, b_m])$ and $L_2 = ([c_1, d_1], \dots, [c_n, d_n])$ be two sequences of intervals consisting of nonnegative integers with $a_1 \geq a_2 \geq \dots \geq a_m$ and $c_1 \geq c_2 \geq \dots \geq c_n$. We say that $L = (L_1; L_2)$ is potentially $K_{s,t}$ (resp. $A_{s,t}$)-bigraphic if there is a simple bipartite graph G with partite sets $X = \{x_1, \dots, x_m\}$ and $Y = \{y_1, \dots, y_n\}$ such that $a_i \leq d_G(x_i) \leq b_i$ for $1 \leq i \leq m$, $c_i \leq d_G(y_i) \leq d_i$ for $1 \leq i \leq n$ and G contains $K_{s,t}$ as a subgraph (resp. the induced subgraph of $\{x_1, \dots, x_s, y_1, \dots, y_t\}$ in G is a $K_{s,t}$). In this paper, we give a characterization of L that is potentially $A_{s,t}$ -bigraphic. As a corollary, we also obtain a characterization of L that is potentially $K_{s,t}$ -bigraphic if $b_1 \geq b_2 \geq \dots \geq b_m$ and $d_1 \geq d_2 \geq \dots \geq d_n$. This is a constructive extension of the characterization on potentially $K_{s,t}$ -bigraphic pairs due to Yin and Huang (Discrete Math. **312** (2012) 1241–1243).

Keywords: degree sequence, biigraphic pair, potentially $K_{s,t}$ -bigraphic pair.

2010 Mathematics Subject Classification: 05C07.

REFERENCES

- [1] M.J. Ferrara, M.S. Jacobson, J.R. Schmitt and M. Siggers, *Potentially H -bigraphic sequences*, Discuss. Math. Graph Theory **29** (2009) 583–596.
doi:10.7151/dmgt.1466

¹Supported by National Natural Science Foundation of China (No. 11561017) and Natural Science Foundation of Hainan Province (Nos. 20151004 and 2016CXTD004).

²Corresponding author.

- [2] D. Gale, *A theorem on flows in networks*, Pacific J. Math. **7** (1957) 1073–1082.
doi:10.2140/pjm.1957.7.1073
- [3] A. Garg, A. Goel and A. Tripathi, *Constructive extensions of two results on graphic sequences*, Discrete Appl. Math. **159** (2011) 2170–2174.
doi:10.1016/j.dam.2011.06.017
- [4] H.J. Ryser, *Combinatorial properties of matrices of zeros and ones*, Canad. J. Math. **9** (1957) 371–377.
doi:10.4153/CJM-1957-044-3
- [5] A. Tripathi, S. Venugopalan and D.B. West, *A short constructive proof of the Erdős-Gallai characterization of graphic lists*, Discrete Math. **310** (2010) 843–844.
doi:10.1016/j.disc.2009.09.023
- [6] J.H. Yin and X.F. Huang, *A Gale-Ryser type characterization of potentially $K_{s,t}$ -bigraphic pairs*, Discrete Math. **312** (2012) 1241–1243.
doi:10.1016/j.disc.2011.12.016

Received 6 July 2015
 Revised 13 April 2016
 Accepted 13 April 2016