ON A JENSEN–TYPE INEQUALITY FOR GENERALIZED
f–DIVERGENCES AND ZIPF–MANDELBROT LAW

ĐILDA PEČARIĆ, JOSIP PEČARIĆ AND MIRNA RODIĆ

Abstract. By means of one new Jensen-type inequality for signed measures which is characterized via several different Green functions, in this paper we derive new inequalities for generalized $f-$ divergences. The applications on the Zipf-Mandelbrot law, as one specific kind of probability distributions, are also given.

Mathematics subject classification (2010): 26D15, 60E05, 94A17.

Keywords and phrases: Green function, Jensen inequality, $f-$ divergence, Zipf-Mandelbrot law.

REFERENCES

[1] I. CSISZÁR, *Information measures: A critical survey*, Trans. 7th Prague Conf. on Info. Th., Statist. Decis. Funct., Random Processes and 8th European Meeting of Statist., Volume B, 73–86, Academia Prague 1978.

[2] I. CSISZÁR, *Information-type measures of difference of probability distributions and indirect observations*, Studia Sci. Math. Hungar. 2, 1967, 299–318.

[3] S. S. DRAGOMIR, *Some inequalities for the Csiszár φ -divergence when φ is an L-Lipschitzian function and applications*, Ital. J. Pure Appl. Math., 15, 2004, 57–76.

[4] L. HORVÁTH, Đ. PEČARIĆ AND J. PEČARIĆ, *Estimations of f− and Rényi divergences by using a cyclic refinement of the Jensen's inequality*, J. Bull. Malays. Math. Sci. Soc. 2017, https://doi.org/10.1007/s40840-017-0526-4.

[5] J. JAKŠETIĆ, Đ. PEČARIĆ AND J. PEČARIĆ, *Some properties of Zipf-Mandelbrot law and Hurwitz ζ -function*, Math. Inequal. Appl. 21 (2), 2018, 575–584.

[6] J. N. KAPUR, *A comparative assessment of various measures of directed divergence, Advances in Management Studies, vol. 3*, 1984, 1–16.

[7] S. KULLBACK, *Information Theory and Statistics*, J. Wiley, New York, 1959.

[8] S. KULLBACK AND R. A.LEIBLER, *On information and sufficiency*, Annals Math. Statist. 12, 1951, 79–86.

[9] F. LIESE AND I. VAJDA, *Convex Statistical Distances (Teubner-Texte Zur Mathematik), vol. 95*, Teubner, Leipzig, Germany, 1987.

[10] R. MIKIĆ, Đ. PEČARIĆ AND J. PEČARIĆ, *Inequalities of the Jensen and Edmundson-Lah-Ribarič type for 3-convex functions with applications*, J. Math. Inequal. 12, 3, 2018, 677–692, dx.doi.org/10.7153/jmi-2018-12-52.

[11] Đ. PEČARIĆ, J. PEČARIĆ AND D. POKAZ, *Generalized Csiszár's f− divergence for Lipschitzian functions*, Math. Inequal. Appl., accepted.

[12] Đ. PEČARIĆ, J. PEČARIĆ AND M. RODIĆ, *About the sharpness of the Jensen inequality*, J. Inequal. Appl. (2018), 2018:337, https://doi.org/10.1186/s13660-018-1923-4.

[13] J. PEČARIĆ, I. PERIĆ AND M. RODIĆ LIPANOVIĆ, *Uniform treatment of Jensen type inequalities*, Math. Reports 16 (66), 2, 2014, 183–205.

[14] J. PEČARIĆ AND M. RODIĆ, *Uniform treatment of Jensen type inequalities II*, Math. Reports, 21 (71), 3, 2019.

[15] A. RENYI, *On measures of entropy and information*, Proc. Fourth Berkeley Symp. Math. Statist. Prob. Vol 1, University of California Press, Berkeley, 1961.

[16] I. VAJDA, *Theory of Statistical Inference and Information*, Kluwer, Dordrecht, 1989.

© ELEMENT, Zagreb
Paper MIA-22-102

Mathematical Inequalities & Applications
www.ele-math.com
mia@ele-math.com