Statistical extensions of some classical Tauberian theorems for Cesàro summability of triple sequences

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Tauberian theorems for Cesàro summability method were firstly obtained by Tauber. Tauber proved that necessary condition for the convergence of single sequences which are Cesàro summable is $n\Delta_n u_n = o(1)$. However, this condition was reduced to the two-sided boundedness condition by Hardy. Thereafter studies done related to this subject were concentrated on the weakening of condition given by Tauber.

In this paper, we show that the conditions under which P-convergence follows from the statistical convergence which behave as a summability method for triple sequences. In section 2, we present some lemmas which will be used in the proofs of our main theorems. In section 3, we prove that a statistically convergent triple sequence is P-convergent under two-sided boundedness conditions and slowly oscillating conditions in certain senses. In last section, we show that the $(C,1,1,1)$ means of a statistical convergent triple sequence is also statistical convergent under the boundedness condition of the sequence and we also give some classical Tauberian theorems for a triple sequence that P-convergence follows from statistically $(C,1,1,1)$ summability under the two-sided boundedness conditions and slowly oscillating conditions in certain senses. In the last theorem of this section, we obtain the statistical convergence of a sequence from its statistical $(C,1,1,1)$ summability under weaker conditions. All of these theorems demonstrate that some theorems given by Móricz and Schoenberg are also valid for triple sequences.