

## A Mathematical Problem Arising in Printing Technology

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A version of a time dependent decision problem arises in printing technology. Color printers render a continuous range of colors using a few discrete ones. The printer must “*decide*” which of these few colors to print at a given pixel. Error diffusion is a greedy algorithm used to make the decision. In general terms, a polytope in  $n$ -space is given and a sequence of demands,  $\gamma_k$ , of points in the polytope is prescribed. The problem is to prescribe a sequence of vertices  $v_k$  of the polytope such that the average of the  $v_k$  converge to the average of the  $\gamma_k$ . At time  $k$ , error diffusion chooses the vertex which minimizes the accumulated error. We give a proof of the convergence of the algorithm using some delicate geometry. This is joint work with quite a few of my colleagues at IBM, Roy Adler, Bruce Kitchens, Marco Martens, Charles Tresser, Chai Wah Wu and with Charles Pugh who was visiting IBM.