Towards the classification of (P and Q)-polynomial association schemes

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This is a survey talk on the subject of the title above. In his lectures at Ohio State University in the late 70s, Eiichi Bannai proposed the classification of (P and Q)-polynomial association schemes; he regarded them as finite, combinatorial analogue of compact symmetric spaces of rank 1. I will trace the history back to the late 60s and explain how the concepts of P/Q-polynomial association schemes arose in relation to finite permutation groups, coding/design theory. I will then overview the progress of the classification in the 80s, 90s and thereafter. Finally I will present my personal view about the scope for the classification problem.

This talk is based on my lecture at the GAP seminar of USTC which is aimed at helping graduate students bridge the gap between established mathematics and the frontiers of mathematical research.