Abstract. For the proof of his classical criterion, a positive quadratic form is extreme if and only if it is perfect and eutactic, Voronoi identified quadratic forms with their coeffficient vectors. This idea has found many applications. After a survey of the literature we consider new applications to the following fields: John type and minmum position problems, Lattice packings of balls and smooth convex bodies Lattice coverings of balls Lattice zeta functions