Min Queens to cover the chess board

Solve the following optimization problem

Determine the minimum number of queens to protect all cells of a chess board

$$\min \sum_{i,j} U_{i,j}$$

$$\forall_{i,j} \ if \ \frac{j-c}{i-r} = -1 \implies \sum_{c,r} U_{c,r} \leq 1$$

$$\forall_{i,j} \ if \ \frac{j-c}{i-r} = 1 \implies \sum_{c,r} U_{c,r} \leq 1$$

$$\forall_j \sum_i U_{i,j} \leq 1$$

$$\forall_i \sum_j U_{i,j} \leq 1$$

$$\forall_{i,j} \begin{cases} if \ |\frac{j-c}{i-r}| = 1 \\ or \ j = c \\ or \ i = r \end{cases} \implies \sum_{c,r} U_{c,r} \geq 1$$

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