

An application of dynamic programming in American football

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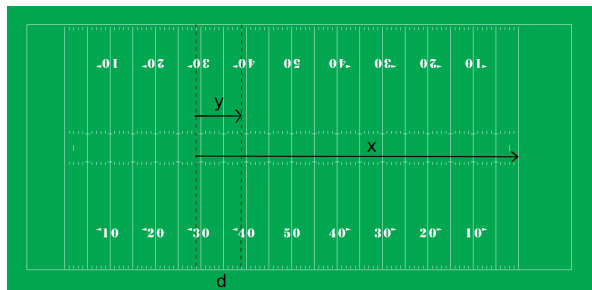
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April 4, 2017

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The Football Model



- States: (x_i, y_i, d) , 15250 total states
- Actions: (P, R, U, K)
- Rewards: TD = 6.8, FG = 3, S = -2, Off Ex = $-\frac{6.8x}{100}$
- Aim: Find the optimal policy

DP Equation

$$\mu^k(i) = \arg \max_{u \in U} \left[\sum_{j \in S} p_{ij}(u) (g(i, u, j) + J^{\mu^{k-1}}(j)) \right]$$

Note: In reality J is difficult to compute, instead we use \tilde{J} .

API and OPI Policy Updates

- API: Many training sample points, few iterations
- OPI: Few training sample points, many iterations