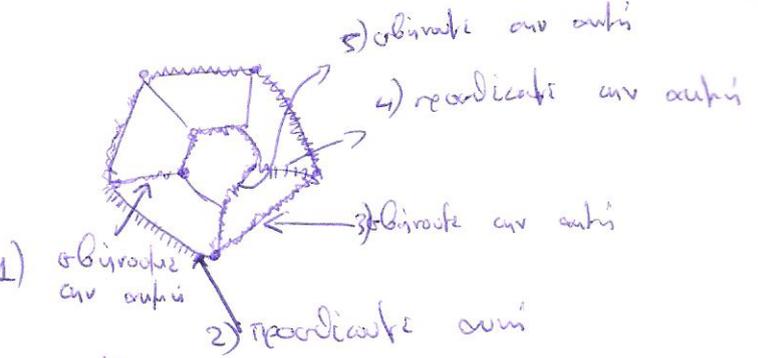


11/11/11

Theorem: Finding a NE which maximizes the total payoff is NP-Hard.

Theorem: Finding some NE is PPAD-Complete

Cubic graphs: degree=3

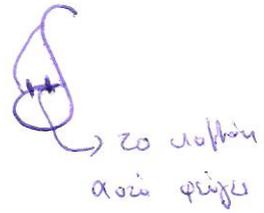


Theorem of Smith:

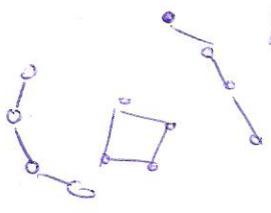
Κάθε cubic graph έχει κύκλο Hamilton

Αυτοθαύματος να βήματα διασφαλίσει πάντα ένα δ. Τέλειο να προκύψει πάντα κύκλος Hamilton.

(Διασφαλίσει οι αυτες που αυτάρου το ~~αυτάρου~~ βαθμό 3 σε κώνου κύκλω)



Ar έχουμε κύκλο Hamilton μπορεί να βρούμε άλλο; PPAD Complete?



Με δεδομένο ένα κύκλο ξεκίμα να βρούμε άλλος κύκλος εκτός δ

PPA - Complete

Proposition: Finding some $\frac{1}{m}$ -approximate NE is PPAD-Complete

ϵ -approximate: $u_i(\sigma_i, \sigma_i) \geq u_i(\sigma_i, \sigma_i) - \epsilon$

Theorem: There exists a 0.34-approximate polynomial time algorithm

Theorem: There is an ϵ -approximate algorithm for NE with running time $O(n \frac{\log n}{\epsilon^2})$

[Mankatis-Mehta-Lipton]

Payoffs:

$$A = \begin{bmatrix} & & & \\ & & & \\ & & & \\ & & & \end{bmatrix} \quad B = \begin{bmatrix} & & & \\ & & & \\ & & & \\ & & & \end{bmatrix}$$

Pure NE? m^2 values: trivial problem

Mixed: Support of player i at a NE = set of strategies with non-zero probability.

Theorem: Every game has an ϵ -approximate NE with support of size at most $\frac{\log n}{\epsilon^2}$



(x, y) is NE

Payoff of player 1: $y^T \cdot A \cdot x$

Payoff of player 2: $y^T \cdot B \cdot x$

k-uniform strategy: we select k ^{pure} strategies (perhaps with repetition) each with probability $\frac{1}{k}$
 $k \approx \frac{\log n}{\epsilon^2}$

Theorem: For every NE (x^*, y^*) and $\epsilon > 0$, for $k > \frac{12 \log n}{\epsilon^2}$ there are k -uniform strategies (x, y) such that:
 (x, y) : ϵ -approximate NE

$$|y^T \cdot A \cdot x - y^{*T} \cdot A \cdot x^*| < \epsilon$$

$$|y^T \cdot B \cdot x - y^{*T} \cdot B \cdot x^*| < \epsilon$$

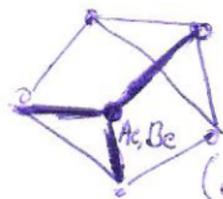
test ~~scribble~~

n^k strategies

GE χ^2

$n^O \left(\frac{\log n}{\epsilon^2} \right)$

Graphical Games



Find NE: PPAD complete? YES

(approximate) Correlated equilibria: in P