SC 631: Games and Information	**Autumn 2014**

Lecture 1: August 14

Instructor: Ankur A. Kulkarni — *Scribes: Tarun, Mridul and Deependra*

Note: *LaTeX template courtesy of UC Berkeley EECS dept.*

This lecture's notes illustrate some uses of various LaTeX macros. Take a look at this and imitate.

1.1 Some Definitions

1.1.1 Event

An event is a subset of Y if w=Y is the state of the world then we say event A obtains in w, if w=A.

1.1.2 $F_i(\omega)$

$F_i(\omega) \triangleq$ that event F of Fi s.t. $\omega \in F$

1.1.3 Knowing an Event

P_i knows event A in state of the world ω if $F_i(\omega) \subseteq A$
$\implies \forall\ \omega\prime \in F_i(\omega) \implies \omega\prime \in A$

1.1.4 Knowledge Operator $K_i(A)$

$K_i(A)$= { $\omega \in Y \mid F_i(A) \subseteq A$ } $K_i(A)$is the set of all those states of the world when player $P_i$knows A

1.1.5 Common Knowledge

An Event A is common knowledge in state of the world ω if for all $i_1, i_2, ...i_n \in N, n < \infty$
$\omega \in\ K_{i_1}K_{i_2}K_{i_3}.....K_{i_n}(A)$

1.2 Some theorems and stuff

- If $\omega^*\in$ Y is the state of the world then P_i knows A in ω^* iff $\omega^*\in K_i(A)$
- K$_j(K_i(A))$ = Event that P$_j$ knows that $P_i$knows A

1.3 Important Properties

- $K_i(A) \subseteq$ A
- A $\subseteq$ B
  $\implies K_i(A) \subseteq$ K$_i(B)$
- $\forall A \subseteq$ Y, $K_i K_i(A) = K_i(A)$
- $K_i(A) \cap K_i(B) = K_i(A \cap B)$
- $K_i((K_i(A))^c) = (K_i(A))^c$

Lemma 1.1 *If A is common knowledge in ω, and $B \supseteq A$, then*
B is also common knowledge in ω(follows from property 2)

Lemma 1.2 *If A is common knowledge in ω, then*
$\omega \in K_i(A)$and $F_i(\omega) \subseteq A$ for i

Theorem 1.3 *If A is common knowledge in ω and $\omega\prime \in F_i(\omega)$ for some $i \in N$, then A is common knowledge in $\omega\prime$*

A is common knowledge in ω
$\implies \omega \in K_i K_{i_1} K_{i_2} ..... K_{i_n}(A) \; \forall i_1, i_2, ...i_n \in N$
Suppose $\omega\prime \in F_i(\omega)$,
$\omega \in K_i(K_{i_1} K_{i_2} ..... K_{i_n}(A))$
$\implies F_i(\omega) \subseteq K_{i_1} K_{i_2} ..... K_{i_n}(A)$
$\implies \omega\prime \in K_{i_1} K_{i_2} ..... K_{i_n}(A)$

1.4 Next topic

Here is a citation, just for fun [CW87].

References

[CW87] AUTHOR1 and AUTHOR2, Title of the paper *Name of the Journal*, 2014, pp. 1–6.