Tues Aug 7, 1956 McCarthy: 6

What about use of true computer for chess and checkers.

704 was 24 μsec/instruction.

Th. 2 armed bandit problem: we have 2 1 armed bandits — each with its own payoff proby, P_1; P_2. We don't know P_1 and P_2, but we are gn. Th. aprip $f(P_1, P_2)$. Th Q. is how to play. Play depends on no. of trials expected. If we have many trials, we may work them ≈ij for a while, to get info, then work th. best one only.

There is an optimum constant time for deciding how good a position is. ∴ if we play very deep, its time should be negligable compared to th. amt. of time spent updating positions.

Th. plausable move program (if such is expedient) is more imp., however, in determining total time required.

"plausable move program" is an operator that has as input, th. board state, and th. pl. moves as outputs.

— Contrast with "Evaluation procedure", which is simply a board state functional.

Th. moral is, that even in chess (not only checkers), if one does play, say 10 or 20 moves into th. future, that th. time required for th. final eval. is negligable, compared to th. time required for updating. It still, however, is probably worth while to spend much time on final position eval., since it is equivalent to a factor of ~ 100 (say for 2 moves deep) in computation time. At any rate, th. time per move, for a very large computer, will be determined by th. time nec. to select plausible moves. At any rate a good eval scheme will just add that much to th. effectiveness of play. Th. point is, that th. time to be spent on end-position eval, th. time spent on determining plausable moves, and n, th. move depth, are all to be selected independantly.

Th. time per move = $(n T_p + T_{Ev.}) K^n$ (No) see next page

n = depth, T_p = Time spent in determining plausible moves, final posit. T_{EV} = eval. time.

So indipendantly we want to reduce k (?)
reduce T_p and T_{eval}, increase n — in line with ↑ in efficacy and reducing total time.

T_{eval} has a method of determining its goodness.

n is indip of everything.

Th. problem of how large to make T_p and k is n't clear.

It appears that T_p and $T_{ev.}$ may be of th. same order of magnatude.

It would seem a lot easier to invent a pseudo chess with simpler moves. T.M. would play human players that have as much training in the game as it has.

Th. time per move $= \left(k^n + k^{n-1} + k^{n-2} \ldots\right) T_p + k^n T_{ev.}$

$= \frac{k^{n+1}}{k-1} \approx k^n$ $\quad \left| k \leq k^n - \leq k^n \right.$ $\left. = k^{n+1} \right.$

McCarthy on Artificial intelligence.

1) Program must improve itself
2) How machine can write programs for itself.

Probably McC is content to solve what th. prediction problem by building a min. machine. — which is a problem of th. 2nd kind.

Logical problems and proofs:
syntactical methods: rules for ktng chains into new chains
Semantic " : use of examples to suggest theorems or use of counter examples to prove counter theorem/.

Bigalow says that for recognizing signals in noise, there is no lower threshold of perception. That for sine in noise (sound) with enuf cases, th. observer will get average > 0.

McC thinks chess imp. because of small ad-hock instructions that it is good to know how to program (?) This isn't too clear to me. At any rate, McC is still strong for chess.

Samuels doesn't feel chess has much over checkers, but will go along with McC. Samuels doesn't seem too happy about how to get learning out of checkers, either.

Selfridge doesn't think chess is so great, but will go along with McC. Also S. thinks some statistics are nec. for learning — contrary to McC.

Rochester isn't to hot on chess, — but will go

along with McC if there is nothing better. Nat's pet idea is th. proby. problems in Feller — (which I think is too hard to start on — tho eventually my machine should be able to do it). Nat also seems to like Marv's ideas, but these latter aren't concretely formulated enuf for Nat to start on them (perhaps).

Shannon is interested in chess, but isn't too enthused over its relevance to the art. int. problem.

Minsky is very much against chess, also would like to get more active interest in his own approach, which is Geometry, with figure drawing and a kind of model.

Bigelow Is to remark of chess, and any other approach, is not so optimistic about how good T. M.'s can be in a few yrs. Is usually rite on most questions, but hasn't really moved to any particular side.