Th Ap 2, 64 TMY

Plan

.01: 776.90 II Th. Trng Seq. :

There are several possl. types of Trng. seq. that I may want use. A few of them are:

.04 1) TM starts with ~~very limited~~ childrens' text of very limited vocab. and very limited/ grammatical structure spectrum of (gn. very freq. to be sure TM is looking for Th. relevant cogs. The text developes as rapidly as possl. to Th. pt. at which TM can use a (Eng → Eng) dictionary. Next ~~[illegible]~~ sub-goal in Th trng. seq. is TM's ability to use an encyclopedia. Another sub-goal of much import, is TM's ability to get some info from figs. of speech and other strange expressions like 765.10. Another sub-goal is TM's ability to deal with various typo errors, and grammatical errors, and literally "meaningless" ss.

For each QA in Th. Trng. seq., TM's "successful" completion of that QA means that it has found a way to obtain Th. right answ. (or a set of s's equiv. to that A), by assigning a hy priori to that (set of) answ(s). Also, it must have a search routine for finding such an op. in a reasonable time. If TM is unsuccessful in either of these pts., he will present an output query stating what Th. situation is. Th. operator (≡ client) then must present acceptable solns. to these probs. on Th. "special input channel".

With this extra info in Th. corpus, TM will try again on Th. prob. in Q, and present Th. pros and cons of solns. and search time resulting from Th. new suggestions. Th. [illegible] then decides whether his input suggs. have [illegible] equate.

Input suggs. will take Th. form of a hy priori Th. A could have been

TM$_1$

Th Ap 2, 64

Plan

.01: 777.40 : Corpus. Suggs. must also show how such a rule have been found by a not-excessively long search. (Such would be a sugg. for TM$_2$).

At any time TM$_1$ consists of an operator that, on any input Q, and processes it with, it known to produce an output A / or a set of output A's of [illegible] with proofs being listed. If unable to do so, TM$_1$ will state that it cannot, and tell how far it has gone toward goal.

TM$_2$'s job is to improve TM$_1$'s work in the sense of speed and memory use as well as "accuracy" of predns. This is with resp. to the goals of answering the Q's.

.20 2) TM$_1$ starts with the simple text of 1) (777.04), but is given at first, not Q A's but the problem of xlting of Eng. into SL. Also trg. for SL → Eng. When TM has learned this, the problem of xlting Q's into SL is taught. ~~Next, an integration of that processes in which TM must go to from Q to A~~

Next, TM is given a text in SL, also Q's in SL, and is taught to answ. Q's in SL. At first simple Q's in which the A's are just a subset of s's in the text. Next, more complex Q's are considered involving xfmns among several s's in the text.

Next, the processes are integrated by Eng. text Q's in Eng. and A's in Eng. At first TM does this by (Eng text → SL Text; Eng Q → SL Q) → SL Ans. Later, TM$_2$ finds more rapid ways to find acceptable of these intermed. steps. The SL lang. for TM$_1$ & TM$_2$ is a necessity

ThAp 2, 64 — TM8

Phn

101 : 778.40: → Th. tng. seq. of 2) (778.20) could be used as a pre- to that of 1) (777.04) — and prebly will be.

In any case, th. "sugg. channel" should be used to make TM "understands" everything he learns..

3) A third kind of Tng. seq., in which we start with fairly complex text, and very elaborate explanns on th. "sugg. chanl." —

Hvr., to do this, we must have a large corpus of such for TM to start on — so he can legitly "find" various "success" rules for relating text and Q to A. This is very diff to do, because for just one QA, TM will have to devr. an enormous no. of rules. These would not only be rules directly used in th. sentence involved in th. QA, but would be rules used in "understanding" other ss, so that rules directly relevant to th. present QA will have an adequate sample.

→ So this third kind of Tng. seq. doesn't look too hot.

III TM's Internal operation:

As was mentioned, TM, consists, at any time, of an operator, that xfm any Q, along with th. existing text, into an actual A or set of A's with their correspg proosts. So TM, is an pgm. with 2 args: (a) th. text (including all known QA's) (b) th. present Q.

Also, assoc. with TM, is a symbolic pgm. or set of pgms. ... of TM, in th. sense of CMI, or ... are ... of "regularities", or derns of inductive methods, equiv. to derns of part or all of th. corp...

Th Apr 2, 64 T.M.J

Plan

.01:779.40! Consider, e.g. Th.' problem of learning Eng → SL

TM is gv. Th.3 large corpus of Eng, SL pairs, to start out

Then, TM_2 starts with Th. first pair in Th. corpus and tries

find an op. that xfms it into Th. corresp. SL (or equiv.

TM is given Th. rules for certain equivs. betw. SL exp

Actually, TM_2 wants an op that will do Th.3 for all Th. p

Th. corpus, but he is starting with a "part op." This "part

will complete Th. Eng → SL xfmn. wherever it is applicable. Th. p

is, it should produce no errors in MT.

Ops. will usually (if not always) be constructed of "obs" and

An "ob" is an observer. It looks at a string and has an

output that is 1 or 2, ... or n. This is a decision op

and tells what ob a/o op. to apply next to Th. string in

"ops" actually xfm. Th. string into a new string.

All obs. are a subset of ops. All obs and ops

be constructed by combining other obs and ops in standard

ways, so obs and ops are easily defined in terms of their

obs and ops that have been defined. This makes / proofs

easy to compute. Also, it may be useful, for proof evaln. to

define obs and ops recursively (like LISP).

My tentative idea as to how this would work: For this small

corpus, I give TM_2 an op. that works. This is a TM_1

Also, I try to find a minimal dcrn. of Th. op. I've

I do this by try to find sub-obs and sub-ops. and d

them hairarchically a/o recursively. — So I also

"dcrn" of TM_1 (779.35). From this "dcrn" there is

to compute its proof.

This form of TM_2 must conform as much as

to how I do this MT

Th. Ap 2, ~~64~~ TMY

Plan

prob. 780.40

.01: ~~781.40~~ : Next, I add a few more (Eng, SL) pairs, in wh[ich] old rule will not work. TM_2 must then modify th. ex[isting] rule to obtain one that will work for all cases th[us far].

I then "give" TM_2 th. modified form of T[M1] (symbolic form of 779.35) that will work th. new as well as o[ld] pairs. I also tell TM_2 how he could have looked for [the] ops. so he would have found th. "correct" one in a rea[sonable] length of time. This search routine is also gn. in "symbolic form".

TM_2 has a fixed routine for going from th. "symb[olic form]" of TM_1 to th. actual pgm. (I.E.: this amounts to a compile[r])

I continue to give TM_1 new pairs, that involve new rules, and I try out TM_2's rule to see if it is adequ[ate] to find th. new TM_1 rule. If it is not, TM_2's dcrn. mu[st] be modified. This is th. job of TM_3, but at first I do th. modification of TM_2 and express this modification [in] "symb. form".

At some hy value of n, TM_n will be ma, b[ut] will be a fairly fixed routine.

In th. final PMTM, TM_2 or TM_3 will be one of th. nor[mal] "modes" of TM_1 — so PMTM will be able to attempt to improve itself."

At first, it will not be possl. to use th. "special sugg[estions]" (776.22), because TM will not "understand" Eng. or SL. For this reason, it mite be best for TM to learn SL text first, i.e. before MT (Eng→SL), so that he will understand" SL [if] possl., and ∴ be able to properly interprete su[ch] sugg. [illegible]

F Ap 3,64

Plan

TMY

.01: 7Mr.70: The IR aspect of QATM operation: As data comes in
text, TM codes this info partially — i.e. it assigned index terms
various sections and subsections. These index terms are
for quick retrieval (i.e. isolation of parts of M. that
that very probly contain M. info) with resp. to expected
and, at first with resp. to past Q's (since these are an aid
future Q's).

As new kinds of Q's are asked, new index terms are
and old ones may be discarded (depending on M. form of
and old text may be reindexed, if it seems to
The depth of indexing (i.e. M. amt. of info contained in M
index terms), will depend much upon the material, upon
M. speed/ of response that is needed when a Q is asked. If low response
speed is O.K., then shallow coding will be used, and much
material will be retrieved and "reread" to answ. a Q.

SN The importance of an all over analysis of TM operation
with resp. to an "ultimate goal" is impt., in that much of
M. operation of M. hum. brain, and one's intuitive observat
on it, are involved in problems that are not pure ind
E.g. M. IR problem involves use of index terms, a
varying preliminary (first pass) depths of coding
would be relevant to a "pure" ind. inf. machine whose
was simply rapid answ. of a Q, with all work starting after
M. Q was asked.

Info is stored in hum. brain (and probly in TM), in
ways — depending on M. speed (and accuracy) of access
For infreq. used info., knowl. of where M. info is obtainable
Say M. name of M. book. Even this will not be
there is a simple rule to go from M. Q to M. place
of its in any encyclopedia). The rule

Sat Ap 4, 64 TMY

Plan

.01:782.40 : If R. info could be deduced from a simple gen'l. plus a few params., then R. rule and params. are stored. Very rapid access is not needed.

In all cases, if rapid access is needed, R. info is in a form in which it may be most quickly used. Also, it is in a way that makes it very likely that R. situation or Q. requires it, will indeed, call it up.

Probably a direct, // access mem. on many index terms (like Z-coding) would be very fine for much of mem. The so-called "assoc. means" could also be used.

For very freq. used facts, R. facts themselves are stored instead of their source. Then, if R. text repeats a stored fact, the fact is not rerecorded.

A human stores info and parts of info with resp. to R. kinds of Q's he has been asked, and with resp. to R. kinds of Universe he has seen (or thinks he has seen) in R. past. These facts make it possl. for him to ignore a very small part of his input, w.o. danger of error in reconstructing the supposedly observed scene.

If, however, any thing is shown a person is shown a scene markedly different from that he has seen before, and/or asked Q's entirely different " " " " been asked before, his abss. may lead him to entirely wrong results. His reconstruction of R. scene will be wrong.

E.g. If he's only seen info with B.W. TV then he can use 2 pts./sec. to characterize info he sees in B.W. > if his characterization pts/sec will give a false

Tu Ap 7, 64

TM's

Plan:

.01 : 783.40 :

IV General Idea of this TM:

Ideally, we could start out with a TM that had within it the appropriate info that a human has at birth — including various heurs and general principals of induction. We could then feed this TM a Typ seq. ℕ to that which a human child ordinarily recvs., (with slite modifications in accord with F B info we get by asking Q's of TM). From this it could eventually get TM to read Engl., and to improve (learn to "improve" general computer pgms., and finally, to improve itself.

However, since we're rather uncertain as to what info a human has at birth (— also this birth info and methods may be closely linked to the technology used in human systems and ∴ possibly inappropriate to an "electronic" (say) machine), we take the following tack:

We start out with a simple typ. seq. and do more complex probs. At first, we tell TM how to solve the probs — using as "minimal" a vocab. as possible ("min." in the sense of hy prcost). We also give TM the principals of inductions. We consider our "explanation" of a "soln." to a prob. "adequate", if, after we've given TM the soln., he can then solve ℕ probs. using a non-exassively long search.

We hope that after we have given TM enough probs. along with their "explains", he will have within him, just about all the info that a child would have after that child was able

Tu Ap 7, 64 TMG

Phx

01:784.40 same probs. as TM. R. child and TM walk, hrr, h
arrived at this pt. via difrnt typ. seqs.

After we have gotten to that pt., hrr, fu
seq. of child and TM will be about R. same
except that we can get more detailed f B fr
TM - TM being more "open" to it's ② we co
tell TM how to solve a prob. and give him a
"explann" and know whether that explann
"good enuf" for him.

Tu Ap 7, 64

TMY

Plan

.01:785.40 V Expected Diffics

1) Local Maxima: This is always a big diffy in any n.c. prob

or schemes in which one takes a previously satisfactory pt.

and tries to improve it, or make it acceptable to a slightly

changed envt. — Some standard tricks:

a) Retain several solns. to each prob. (This is normal

anyway). This will make it possl. to have very many essentially

difrn "near by" trials — i.e. trials with hy. prips of success.

b) Retain history of 'hill climb', so that one can "back

a way", and try for new soln. to old as well as new probs.

is sort of automatically done in suggestion a), but it may

necy. to "go back" in the sense of finding more non-

solns. for old probs., before solving the present prob.

satisfactorily.

.20 c) Devise a method for detecting how the new prob.

(i.e. an "ob") from the old, so one can ⓐ recognize it and ⓑ find a "spec"

soln. to the new prob. Later, try to find ways to fit

this "ob" into the entire soln., by simplifying the ob — so that

it need not recognize only the new type of prob. — but can

recognize any prob. in which this new kind of sol

needed. Also, one may be able to simplify the s

to the present prob.

This, at first, ad. soln., can perhaps be (even

with other ad. solns. that have occured in the

W Ap 8, 64 Don (787) TMY

Plan

.01: 786.40: Expected Diftys (cont).

2) Th. Eng → SL phase:

a) I don't have a good SL lang. to use. See work of Bar Dan Bobrow, in Mink's Group; Darlington in Yng. See "Coplon" J. Perry's "Tulag. Abstracts".

b) I don't know just what a genl. form such xfm. rules sh

3) I have Th. Eng → SL ~~...~~ phase for both text and A's. — Then Th. SL for relevant and Th. xfmn of Th. relevant data Th. A of Th. ~~...~~ I will have do this in this el'istically at first, but would like him to do non-el. creatively with Th. option of forming his own SL lang if he wan I don't know just how to get TM to go from el. non-el. operation in this ~~...~~.

4) There are several "figs. of speech" and other "diff types of expressns as 765.20 ff. In Theory, TM could learn understand what these means by ~~...~~ finding Reps. in Th and in Th Text + QA's. / Th. exact way that this sh be done isn't too clear to me.