

Dog Competition Checker Expert System

Project Proposal

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Abstract

This report presents a proposal for developing a Dog Competition Checker Expert System.

This expert system is designed to check a handler and dog for eligibility and success in relation to various types of canine competitions. The report discusses how canine competitions are regulated, organised, and conducted. It summarises some benefits of the expert system. It explains the sources for domain knowledge. Finally, it includes a working prototype of the expert system that shows some sample rules.

Introduction

Various expert systems exist in relation to dogs. Numerous expert systems are designed to help potential pet owners choose a dog of a suitable breed as a pet [6, 7, 8, 9, 17, 23, 24]. At least one expert system is available to diagnose canine ailments [10]. One article used greyhound racing as the knowledge domain while examining expert prediction techniques [14]. However, to the best of the author's knowledge, no expert system exists to check a handler and dog for eligibility and success in relation to various types of canine competitions. An expert system would conceivably be very useful for this knowledge domain because of the variety of canine competitions and the many rules that handlers and dogs must follow to succeed in a competition.

Background

In Australia, the Australian National Kennel Council (ANKC) is the peak administrative body for canine affairs in Australia¹. Each State and Territory has its own controlling body, which is a member of the ANKC. In NSW, for example, the member body is the Royal NSW Canine Council. The State or Territory member body grants affiliation to dog clubs, keeps a registrar of purebred dogs, and sanctions the holding of shows and various trials. This includes canine competitions such as Agility, Earthdog, Endurance, Flyagility, Flyball, Herding, Jumping, Lure Coursing, Obedience, Showing, Tracking, and so on. Although rules and regulations for the competitions may vary among the States and Territories², they must be approved by the ANKC before they can become effective.

In most competitions, a handler³ and dog compete as a pair. The handler instructs his or her dog to perform a series of tasks according to the rules that are appropriate for the type and level of competition. During competition, an authorised judge determines whether tasks are performed satisfactorily⁴. Points are awarded and deducted for, respectively, successfully and unsuccessfully completing each task. Generally speaking, depending on the competition, each task must receive at least a pass mark, and the total score must equal or exceed 85%.

The rules for each type of competition are well-defined but are often regarded as fairly daunting. This is mainly because there are numerous tasks, judging is very strict, and points are usually deducted for the slightest breach of the rules. Points can be lost very quickly. A dog may also be disqualified for lapses such as excessive barking, prematurely leaving a ring, and acting aggressively. For novice and experienced handlers alike, canine competitions can be stressful, but a good knowledge of rules can help to make things easier.

The expert system discussed in this proposal, therefore, provides a quick and easy way for a handler to check: first, whether a dog is eligible to compete in a certain type and level of competition; and, second, whether a dog has successfully completed the series of tasks required by a certain type and level of competition and is, therefore, eligible for an award or title⁵. The expert system also provides some tips for improving performance at competition and avoiding breaches of the rules.

¹ The ANKC, in turn, is one of approximately 80 organisations that are members of the World Canine Organisation.

² In reality, there is very little variation in the rules for canine competitions among the States and Territories.

³ A handler is the human that accompanies his or her dog during a canine competition.

⁴ The size of the dog also influences the requirements for some tasks. For example, in the case of a high jump, a smaller dog is required to jump over a lower height than a larger dog.

⁵ The difference between an award and title is that the former does not allow letters of recognition to be placed before or after a dog's name.

Methodology

The general knowledge domain for the expert system is canine competitions held under the auspices of the Royal NSW Canine Council. Of the types of competitions that fall within this domain, arguably the most important is Obedience. This is partly because canine obedience is a prerequisite for success at any other type of canine competition, and partly because the rules for Obedience are fairly complex given the various levels and numerous tasks in Obedience competitions.

The final expert system, therefore, will include rules for checking Obedience competitions. It will include rules for checking other types of canine competitions if time permits.

The definitive information for each type of canine competition, including Obedience, is in printed rule books available for purchase from the Royal NSW Canine Council. Numerous online sources summarise the rules [1, 2, 3, 4, 11, 15, 16, 18, 21, 22, 25, 26], and these are often more useful than the rules because they include helpful tips for the handler. Expert instructors at many NSW Dog Training Clubs are available to interpret or clarify the rules.

The expert system will be developed using the C Language Integrated Production System (CLIPS). The interface to the expert system will be the text-only command-line system supplied by CLIPS.

Using the text-only user interface, the expert system will provide the user with two input methods.

The first input method will be through menus. Menus will provide the means to navigate up and down a hierarchy (to and from a certain type and level of canine competition) and to exit from the expert system. Users will be able to select a menu option by typing a number. For example, the Main Menu will look similar to this (assuming a variety of canine competitions are included in the expert system):

```
Main Menu
-----
1. Eligibility
2. Obedience
3. Agility
4. Tracking
5. Endurance
0. Exit
Please select an option (0-5):
```

A typical submenu (for example, after selecting "2. Obedience" from the Main Menu) will look similar to this:

```
2. Obedience
-----
Check eligibility for Obedience Competitions and Titles:
1. Encouragement Class
2. Novice Class
3. Open Class
4. Utility Class
5. Champion Class
0. Return to the Main Menu
Please select an option (0-5):
```

The second input method will be through questions, usually requiring a "yes" or "no" answer. After navigating to the lowest possible menu level in a certain hierarchy, the user will be asked a series of questions that is appropriate to the type and level of canine competition - to check whether a dog can compete in a certain type and level of competition or is eligible for a certain award or title. For example, after selecting Encouragement Class, typical questions may include:

```
Can the dog Heel on Lead (at least 15/30 points)? (yes no)
Can the dog Stand for Examination (at least 15/30 points)? (yes no)
Can the dog Stand Stay (at least 15/30 points)? (yes no)
Can the dog Sit Stay (at least 15/30 points)? (yes no)
Can the dog Down Stay (at least 15/30 points)? (yes no)
Did the dog receive a pass score in Encouragement Class competition (at least 115/130
points)? (yes no)
```

Error-checking will be provided to ensure that the expert system accepts only valid menu options or responses to questions.

Prototype

The following listing is a working prototype of the expert system. It shows the use of CLIPS deffunctions, defglobals, deffacts, defrules, the use of control facts to move from phase to phase, assertions, retractions, input by using menus, input by answering questions, and various other CLIPS language constructs:

```

;*****
;DOG COMPETITION CHECKER EXPERT SYSTEM
;Version 1.2, 1 January 2007
;Copyright 2007 John New
;johnn198@gmail.com
;http://www.beaglebytes.com/
;-----
;
;This expert system checks whether a handler and dog are eligible for
;various types and levels of canine competitions and, having completed
;a certain competition, whether the dog is eligible for an award.
;
;*****
;*****
;DEFFUNCTIONS
;*****

;Note: The following two functions were copied from the Automotive
;Expert System (AUTO.CLP) distributed with Giarratano and Riley.

(defun ask-question (?question $?allowed-values)
  (printout t ?question)
  (bind ?answer (read))
  (if (lexemep ?answer)
      then (bind ?answer (lowercase ?answer)))
  (while (not (member ?answer ?allowed-values)) do
    (printout t ?question)
    (bind ?answer (read))
    (if (lexemep ?answer)
        then (bind ?answer (lowercase ?answer))))
  ?answer)

(defun yes-or-no-p (?question)
  (bind ?response (ask-question ?question yes no y n))
  (if (or (eq ?response yes) (eq ?response y))
      then TRUE
      else FALSE))

;*****
;DEFGLOBALS
;*****

(defglobal ?*handler* = "No Name")

;*****
;DEFTEMPLATES
;*****

;none yet

;*****
;DEFFACTS
;*****

;=====
;Initial Fact
;=====
(deffacts init
  (phase init)
);end deffacts init

;*****
;DEFRULES
;*****

(defrule init

```

```

?f <- (initial-fact)
=>
(retract ?f)
(assert (phase ready))
)

(defrule ready
?p <- (phase ready)
=>
(retract ?p)
(printout t crlf
"DOG COMPETITION CHECKER" crlf
"===== " crlf
"This expert system checks whether a handler and dog are eligible for" crlf
"various types and levels of canine competitions and, having completed" crlf
"a certain competition, whether the dog is eligible for an award." crlf crlf
"Before we start, why don't you enter your name? ")
(bind ?*handler* (readline))
(printout t crlf
"Welcome " ?*handler* " to the DOG COMPETITION CHECKER." crlf)
(assert (phase start))
)

(defrule start
?p <- (phase start)
=>
(retract ?p)
(printout t crlf
"Main Menu" crlf
"-----" crlf
"1. Eligibility" crlf
"2. Obedience" crlf
"3. Agility" crlf
"4. Tracking" crlf
"5. Endurance" crlf
"0. Exit" crlf
"Please select an option (0-5): ")
(bind ?option (read))
(if (and (integerp ?option)
(>= ?option 0)
(<= ?option 5))
then (assert (phase ?option))
else (and (printout t crlf "Invalid option " ?option crlf)
(assert (phase start))))
)

(defrule phase-1
?p <- (phase 1)
=>
(retract ?p)
(printout t crlf
"1. Eligibility" crlf
"-----" crlf
"Check eligibility to compete in any competitions:" crlf crlf)
(if (yes-or-no-p "Are you a member of your State or Territory Member Body? (yes no) ")
then (printout t crlf
"Congratulations " ?*handler* ". You are eligible to compete." crlf)
else (printout t crlf
"Sorry " ?*handler* ". You must join your State or Territory Member Body before you can compete."
crlf))
(printout t crlf "Press any key to return to the Main Menu ")
(bind ?option (readline))
(assert (phase start))
)

(defrule phase-2
?p <- (phase 2)
=>
(retract ?p)
(printout t crlf
"2. Obedience" crlf
"-----" crlf
"Check eligibility for Obedience Competitions and Titles:" crlf
"1. Encouragement Class" crlf
"2. Novice Class" crlf
"3. Open Class" crlf

```

```

"4. Utility Class" crlf
"5. Champion Class" crlf
"0. Return to the Main Menu" crlf
"Please select an option (0-5): "
(bind ?option (read))
(if (and (integerp ?option)
         (>= ?option 0)
         (<= ?option 5))
    then (assert (phase (sym-cat 2- ?option)))
    else (assert (phase 2)))
)

(defrule phase-2-1
  ?p <- (phase 2-1)
=>
  (retract ?p)
  (printout t crlf
   "2.1. Obedience - Encouragement Class" crlf
   "-----" crlf
   "Check eligibility for an Encouragement Class award:" crlf crlf)
  (assert (phase 2-1-1))
)

(defrule phase-2-1-1
  ?p <- (phase 2-1-1)
=>
  (retract ?p)
  (if (yes-or-no-p "Can the dog Heel on Lead (at least 15/30 points)? (yes no) ")
      then (assert (phase 2-1-2))
      else (assert (phase 2-1-failed)))
  )
)

(defrule phase-2-1-2
  ?p <- (phase 2-1-2)
=>
  (retract ?p)
  (if (yes-or-no-p "Can the dog Stand for Examination (at least 15/30 points)? (yes no) ")
      then (assert (phase 2-1-3))
      else (assert (phase 2-1-failed)))
  )
)

(defrule phase-2-1-3
  ?p <- (phase 2-1-3)
=>
  (retract ?p)
  (if (yes-or-no-p "Can the dog Stand Stay (at least 15/30 points)? (yes no) ")
      then (assert (phase 2-1-4))
      else (assert (phase 2-1-failed)))
  )
)

(defrule phase-2-1-4
  ?p <- (phase 2-1-4)
=>
  (retract ?p)
  (if (yes-or-no-p "Can the dog Sit Stay (at least 15/30 points)? (yes no) ")
      then (assert (phase 2-1-5))
      else (assert (phase 2-1-failed)))
  )
)

(defrule phase-2-1-5
  ?p <- (phase 2-1-5)
=>
  (retract ?p)
  (if (yes-or-no-p "Can the dog Down Stay (at least 15/30 points)? (yes no) ")
      then (assert (phase 2-1-6))
      else (assert (phase 2-1-failed)))
  )
)

(defrule phase-2-1-6
  ?p <- (phase 2-1-6)
=>

```

```

(retract ?p)
(if (yes-or-no-p "Did the dog receive a pass score in Encouragement Class competition (at least 115/130
points)? (yes no) ")
    then (assert (phase 2-1-succeeded))
    else (assert (phase 2-1-failed))
)
)

(defrule phase-2-1-succeeded
?p <- (phase 2-1-succeeded)
=>
(retract ?p)
(printout t crlf
"Congratulations " ?*handler* ". You succeeded at Encouragement Class. Next level is Novice." crlf)
(assert (phase 2-1-finished))
)

(defrule phase-2-1-failed
?p <- (phase 2-1-failed)
=>
(retract ?p)
(printout t crlf
"Commiserations " ?*handler* ". You failed at Encouragement Class. Please keep trying." crlf)
(assert (phase 2-1-finished))
)

(defrule phase-2-1-finished
?p <- (phase 2-1-finished)
=>
(retract ?p)
(printout t crlf "Press any key to return to the previous menu ")
(bind ?option (readline))
(assert (phase 2))
)

(defrule phase-2-2
?p <- (phase 2-2)
=>
(retract ?p)
(printout t crlf
"2.2. Obedience - Novice Class" crlf
"-----" crlf
)
(printout t crlf "Press any key to return to the previous menu ")
(bind ?option (readline))
(assert (phase 2))
)

(defrule phase-2-3
?p <- (phase 2-3)
=>
(retract ?p)
(printout t crlf
"2.3. Obedience - Open Class" crlf
"-----" crlf
)
(printout t crlf "Press any key to return to the previous menu ")
(bind ?option (readline))
(assert (phase 2))
)

(defrule phase-2-4
?p <- (phase 2-4)
=>
(retract ?p)
(printout t crlf
"2.4. Obedience - Utility Class" crlf
"-----" crlf
)
(printout t crlf "Press any key to return to the previous menu ")
(bind ?option (readline))
(assert (phase 2))
)

(defrule phase-2-5
?p <- (phase 2-5)

```

```

=>
(retract ?p)
(printout t crlf
 "2.5. Obedience - Champion Class" crlf
 "-----" crlf
)
(printout t crlf "Press any key to return to the previous menu ")
(bind ?option (readline))
(assert (phase 2))
)

(defrule phase-3
?p <- (phase 3)
=>
(retract ?p)
(printout t crlf
 "3. Agility" crlf
 "-----" crlf
)
(printout t crlf "Press any key to return to the previous menu ")
(bind ?option (readline))
(assert (phase start))
)

(defrule phase-4
?p <- (phase 4)
=>
(retract ?p)
(printout t crlf
 "4. Tracking" crlf
 "-----" crlf
)
(printout t crlf "Press any key to return to the previous menu ")
(bind ?option (readline))
(assert (phase start))
)

(defrule phase-5
?p <- (phase 5)
=>
(retract ?p)
(printout t crlf
 "5. Endurance" crlf
 "-----" crlf
)
(printout t crlf "Press any key to return to the previous menu ")
(bind ?option (readline))
(assert (phase start))
)

(defrule 0-phase-exit
?p <- (phase 0)
=>
(retract ?p)
(printout t crlf
 "Thank you " ?*handler* " for using the DOG COMPETITION CHECKER." crlf crlf)
(assert (stop))
(assert (quit))
(assert (clear))
)

```

Conclusion

This report has presented a proposal for developing a Dog Competition Checker Expert System, which is designed to check a handler and dog for eligibility and success in relation to various types of canine competitions. The expert system concentrates on Obedience competitions held under the auspices of the Royal NSW Canine Council, NSW, Australia. Domain knowledge for the expert system is available from printed rule books available for purchase from the Royal NSW Canine Council and from other online sources. The expert system will be developed using CLIPS and obtain user input using menus and a series of questions.

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