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Identifiable Problems that Require State Machine Solutions

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ABSTRACT

State Machines are abstract mathematical models of computation that give specific outputs based on the inputs it is given. They are widely used in various industries to provide efficiency as well as conditional statements for problems that require specific solutions from given inputs.

1. INTRODUCTION

As mentioned in the ABSTRACT. State machines are used in pretty much every industry, especially in the use of aircraft's and aerospace technology which we will discuss. Since state machines decide what output is necessary in different situations this can be used to automate human interactions such as aircraft's making flaperons angled based on the wind speeds and strengths of said wind. State machines can be prevalent in various use cases not just for flaperons. Any decision that is based on conditional statements can be used in conjunction with state machines.

Symbol usage:
Q is the set of all states
e refers to the inputs
qo symbolises the start state
root symbol is used for each transition
*

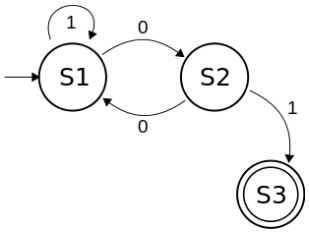

Figure 1. An example state machine for binary input and output

Contributors to Wikimedia projects. (2020, December 11). A-level Computing 2009/AQA. Wikibooks. https://bit.ly/2P1bkzi

2. MAIN SECTION

A finite state machine can also be simplistic such that the only inputs and outputs are binary (0 or 1) allowing a True or False conditional to be met in order to satisfy a successful and effective solution that requires a binary operation.

Kuphaldt, T. R. (2019, January 11). Finite State Machines. Sequential Circuits — Electronics Textbook. https://www.allaboutcircuits.com/textbook/digital/chpt-11/finite-state-machines/

2.1. *Planes without Pilots*

Due to the automation nature of state machines determining the outcome of a given scenario and or input, this can help create future opportunities such as self flying aircraft, removing the need of human interaction and the need for a pilot, saving salary expenses as well as split-decision making as everything will be done using the binary option of state machines, choosing one option or another. Advanced, more complex state machines can be made to account for various outputs, not just two.

Markoff, J. (2015, April 6). Planes Without Pilots. The New York Times. https://www.nytimes.com/2015/04/07/science/planes-without-pilots.html

What could have been impossible for aircraft of high magnitude and scale, like 747 aircrafts, in the past has now been made possible through the selective use of state machines, making the best decisions so the pilots can focus on making a safe and efficient trajectory. A lot of the requirements and decisions can be made through the implemented state machines, reducing human error.

2.2. *comparison*

A simple comparison of the aircrafts from the past and the improved versions of today, is the technology, the electronics help to automate tasks and complete tasks more effectively, reducing the stress and duties of the pilots, the technology continues to aid through functions that humans could not possible do on their own such as lifting aircrafts and moving heavy metal of specific parts of the machines, like plane wings and lowering the runway wheels.

3. SUMMARY

State machines are very much needed in the industries of today for how much we rely on technology day to day. They help make better solutions to problems we wouldn't have even thought about a few decades ago and due to Morse law it has only become exponential.