REINFORCEMENT LEARNING ALGORITHM FOR BLOOD GLUCOSE CONTROL IN DIABETIC PATIENTS

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Abstract :

In this paper a reinforcement learning algorithm is applied to regulating the blood glucose level of Type I diabetic patients using insulin pump. In this approach the agent learns from its exploration and experiences to selects its actions. In the current reinforcement learning algorithm, body weight, A1C level, and physical activity define the state of a diabetic patient. For the agent, insulin dose levels constitute the actions. There are five alternative actions for the agent: (1) raising the insulin infusion rate during 24 hours, (2) keeping it the same, (3) decreasing insulin infusion rate, (4) adjusting basal rate two times during 24 hours, and (5) adjusting basal rate three times during 24 hours. As a result of a patient's treatment, after each time step *t*, the reinforcement learning agent receives a numerical reward depending on the response of the patient's health condition. At each stage the reward is calculated as a function of the deviation of the A1C from its target value. Since reinforcement learning algorithm can select actions that improve patient condition by taking into account delayed effects it has tremendous potential to control blood glucose level in diabetic patients. This research will utilize ten years of clinical data obtained from a hospital.