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Supercomputing Challenge

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Avalanche Dogs

Executive Summary

Avalanche dogs have to be trained in order to be able to search for humans trapped under the snow. It's interesting how they train the dogs to recover a body, they treat it as a game. When they practice, the dogs get a treat at the end and play a game of tug-o-war. For the dog it is fun, but in reality it is a life or death situation. Many have been saved in avalanches from the help of avalanche dogs. It can be a scary situation from under the snow. There is lack of air, great weight pushing down, and the cold can cause hypothermia. Avalanches can bury someone up to 30 feet, which is a lot of snow to dig through. The program is supposed to show an avalanche dog finding a human trapped under the snow. Unfortunately, the school got hacked. All the computers were shut-off and unplugged for about two weeks. IT could not recover any z-drives, which is where the program on the avalanche dogs was kept. This meant that the program was lost, and had to be redone, but not to its full potential. The program could not be matched and little time was left to finish the project. In the end this was mainly overcome but there are still flaws remaining and we have not made significant progress.

Statement Of Investigated Problem

Avalanche dogs go through intensive training to save the lives of people trapped under the snow. Without dogs avalanche rescue would be significantly more difficult, and victims would have a lower survival rate. The dogs are useful in the majority of avalanche situations while things such as beacons are only possible to be successful if the person has special equipment.

Describe Method Solving Problem

Our program does less problem solving but instead demonstrates the manner in which avalanche dogs operate. This in a refined form would have many purposes in demonstration to those entering into a field such as dog training or ski patrol.

How We Validated Our Project

We have done research to better understand the science behind avalanche dogs. This has allowed us to create a scientifically correct model that demonstrates the process a dog uses in finding a human buried in the snow, as well as the human emitting carbon and how the permeation of the carbon occurs. The program uses carbon to locate the human in the program. This is similar to how a actual avalanche dog find a human, though they also use other molecules emitted from humans as well as can in some cases identify other environmental clues.

Study Results

The result of the program are how avalanche dogs in general work using things such as their noses and extra scent glands. We also found valuable information on how they are trained and the superior breeds of dogs for the job. This information could be implemented into later versions of the program is one where to decide to take it further.

Conclusion Reached By Analysis

The conclusion we reached is that the avalanche dog programs around the world are essential to the saving of lives. We also can now somewhat predict timings for a dog locating a human. This shows how much dogs help but yet how dangerous avalanches are. The program shows how essential the quality of the dog training is.

Most Significant Achievement On This Project

This project was not working to to a goal it is mainly to be used and developed for education and dog training. We did achieve a working model that showed a dog locating a human using carbon-dioxide. This is our most significant achievement over this project.

What is An Avalanche Dog?

An avalanche dog is a dog that has been trained to find humans who have been buried in an avalanche. The history of avalanche dogs goes back to the 1800s. Swiss monks would travel through the Alps of Switzerland and Germany to their different Monasteries often times a St. Bernard would lead the way. Many of the avalanche dogs are Golden Retrievers, Saint Bernards, and German Shepherds because of their size and keen sense of smell. The dogs should be energetic and well trained for such a serious job. They are needed to be able to find people buried up to 15 feet in the snow.

How Do Dogs Find People After an Avalanche?

Avalanche Dogs train in Ski Areas across the country to work with human counterparts to respond to the Avalanche. The dogs detect the carbon dioxide, sweat, and possibly a form of skin rafts that humans produce. Skin rafts are scent-carrying skin cells that drop off living humans at

a rate of about 40,000 cells per minute. Once the human is located the dog sticks his nose into to the snow to get a better grasp of the scent. If the scent is stronger the dog will start to dig, indicating the a human is trapped in that spot.

The Dogs Nose

Avalanche dogs rely on their sense of smell to save the lives of those trapped under the snow. This obviously means that dags have a better sense of smell than humans. All dogs have 60 times more olfactory cells than humans, giving the dogs the upper hand and can help them “see” better. Unlike humans, dogs brains have special places for certain scents, allowing them to distinguish a human in the snow from the world around them.

The dog nose has special upside-down raindrop shape. This allows the outgoing air to go out the bottom, and thus pulling more air in for the dog to breath. In addition , dogs have seperate airways for breathing and smelling. This makes it so that they can be more sensitive and only smell when necessary. Smells can become overwhelming if they are always so pungent, and can cause damage to the scent glands. Dogs scent glands are closer to the surface of the skin, making them more sensitive. According to the Marbach Road Animal Hospital, dogs can pick up scents that are diluted to one or two parts per trillion. Significantly greater than any humans sense of smell.

Special Features

When Avalanche dogs search for humans they look for smells that they produce. The scent that the Avalanche dogs track can possibly be evaporated perspiration, respiratory gases, or decomposition gases released by bacterial action on human skin or tissues. If the person is still conscience it is much easier to find the body under the snow, because the are active and aware.

An unconscious person may not be producing enough sweat or breath for the avalanche dog to detect.

Rescuers also use dogs to help find missing people from earthquakes or for search and rescue missions. While on a missing the dog will put its nose to the ground and track for human scent. They should be able to sense if there is a spot where a human could have stepped or traveled. Then follow it to where the human could have gone or ended up. Dogs have a much wider range than humans. Dogs are great companions and can save lives.

Software Products And Sources

NetLogo was the software product used for the programming.

SOURCES

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