Reduction of Concussion in Football

New Mexico
Supercomputing Challenge
Final Report
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Team 19
Centennial High School

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1. Introduction-

We currently are researching and modeling the impact of helmet variation. In researching this topic we have learned plenty about concussions, but before that we must know what causes a concussion itself. Well, the reason behind a concussion. One of the reasons we had initially given this topic consideration was our group member Jerry was recently concussed in the early stages of the challenge which inspired us to do a project related to sports injury. Especially living in the southwest football is a popular sport among the locals and having the second biggest high school football rivalry in your town you can see how we were compelled to do such a project.

the purpose of this project is to hopefully make a change and hopefully reduce the amount of injury in football as a whole without altering the game too much. A change in equipment would in theory change this but for high schools with less funding and the lack of access to technology to alter equipment a minor change in rules may be in order.

2. Description-

Our code is still in the works but what we hope to achieve in the coming weeks is a comprehensive simulation for a frontal collision to calculate the possibility of a concussion using real-life physics and a series of if-then statements. Our current code is a simple setup procedure that has a widespread of turtles each representing a different layer of the helmet having each having a set of properties to mirror the elasticity and density of the corresponding material later getting to the skull and brain which will be affected by the impact force which we will later program.

3. Results-

The results from the model that we previously coded were inconclusive and a lost cause we recently have been working on our new code which we have more applied physics and a set of if-then statement in which the code refers to. The new code has been an interesting to code with the help of our mentor we have been gathering information and placing it into our code as necessary we plan to make a barrier of turtles and other breeds to represent each layer of the helmet and the last layer being the head. The impact will come in as an infected turtle passing on the changing “sickness” to each layer getting weaker as it passes on through the layers of course the “sickness” wont be anything other than a set of variables to represent the collision including force, mass, acceleration, etc.

In our efforts our group had conceived a non-systematic program to simulate a preset collision that would not actually had given us any viable results to conclude and easily manipulatable data that is not reliable to the point of reference or general analysis for that matter. Though we have tried many things for the code we had come to the standing point

through the help of our mentor and the judges who evaluated us to start from scratch in which we would construct a new code from the ground up simulating a different collision that would be in frontal area of the helmet and not over complexing the model as we have already tried we will later continue to make variable to make the impact interchangeable by the user to calculate the force among other variables.

4. Conclusion-

In starting the project we knew next to nothing about concussions since starting the project we have learned that a concussion is a mild form of traumatic brain injury (TBI) caused by a bump, blow, or jolt to the head. Concussions can also occur from a fall or a blow to the body that causes the head to move rapidly back and forth (www.cdc.gov) we have also learned that in traditional football there is 3 different helmet types to prevent concussions for the players position to a certain extent. The linemen who deal with the most frontal collision have thicker helmet with more protection and is also significantly heavier where as the players who are meant to be fast (running-backs, wide-receivers, and quarterbacks) have the exact opposite. These players use lighter less protective helmets in order to increase speed and also have an increased injury rate among the rest of the league. The positions that have no preference of speed or strength use helmets that's are in between much like the ones used in the high school level as regulation equipment. People who have had repeated concussions may have serious long-term problems, including chronic difficulty with concentration, memory, headache, and occasionally, physical skills, such as keeping one's balance. This is one of the many reasons we need to put precautions in place to prevent concussions in high school football especially. The mental injuries associated with this sport take a toll on the players and in doing so may be destroying future opportunities due to medical history and extensive amounts of brain damage from a high school sport that is so popular in America.

5. Recommendations-

We need to add a visual representation of a helmet and add more physics into the code to make it more realistic when getting a concussion in football. Make the physics around the helmet more realistic. Overall we need to improve our code and need to change a lot. We at this point have no actual representive results but the code is on its way to hopefully change this. Though the accomplishments of this project are not many we currently see our biggest on as the ability to hopefully turn this project around as quickly as we started. We hope that next year we can start a lot earlier and work at the pase (or faster) that we have in the previous weeks.

6. Acknowledgments-

the help of our teacher Ms.Hagaman has made this project for us possible and without her wouldn't actually exist. Our mentor Rocky has help up find direction more than anyone that we had previously talked to and he had also helped with the construction of our new code by providing comprehensive notes in which he spent his own time to do so. Thank you.

7. References-

Works Cited

"Can the "Right" Helmet Prevent Concussions?" American Academy for Pediatrics. APA, n.d. Web.

Centers for Disease Control and Prevention. Centers for Disease Control and Prevention, 15 Aug. 2013. Web. 02 Apr. 2014.

Gregersen, Erik. The Britannica Guide to Heat, Force, and Motion. New York: Britannica Educational Pub., 2011. Print.

Johnson, Donald, and Robert A. Pedowitz. Practical Orthopaedic Sports Medicine and Arthroscopy. Philadelphia: Lippincott Williams & Wilkins, 2007. Print.

Karen Kaplan October 28. "Study: No Helmet Brand Can save Football Players from Concussion Risk." Los Angeles Times. Los Angeles Times, 28 Oct. 2013. Web. 02 Apr. 2014.

"Tips on Concussion Prevention." - Orthopaedic Specialists North Carolina Concussion Clinic. N.p., n.d. Web. 01 Apr. 2014.