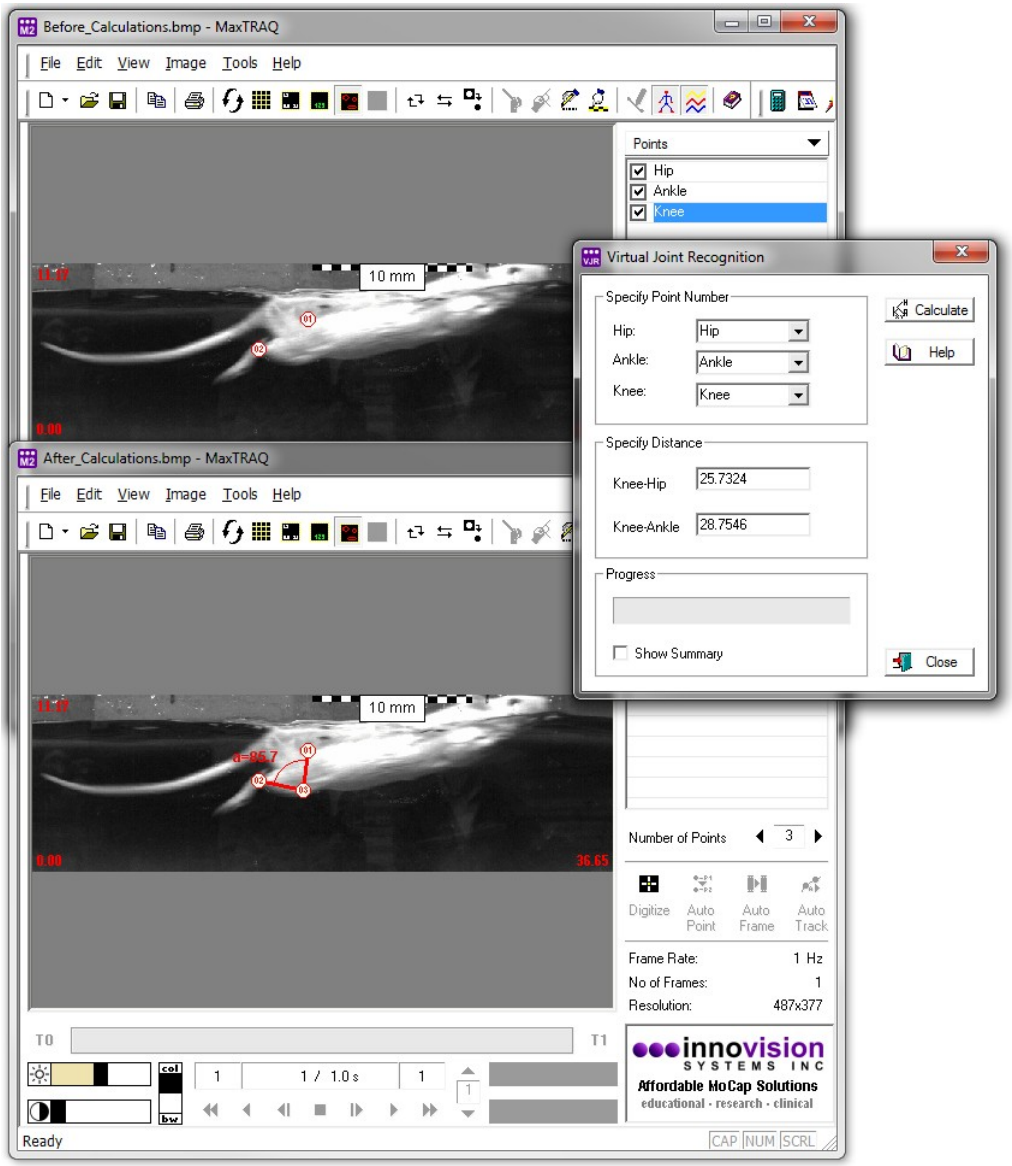
MAXTRAQ VJR

Virtual Joint Recognition (virtual knee modeling)

Use MaxTRAQ VJR to calculate the position of the knee based on known positions of the hip and ankle in rodents. The lengths of the femur and tibia are assigned based on post-mortem measurements or estimates based on age, weight and gender- matched controls MaxTRAQ VJR calculates and plots the position of knee and generates accurate estimates of the hip, knee and ankle angles that are critical to understanding the hind limb kinematics during walking or swimming.



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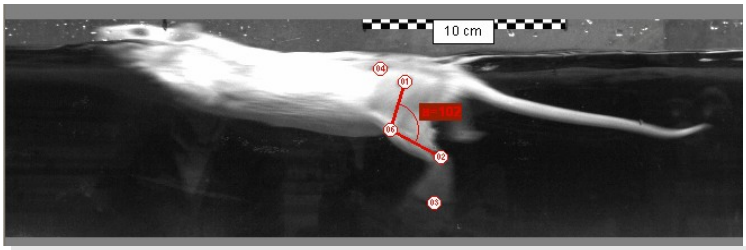
Parts of the calculations used in MaxTRAQ VJR were developed in collaboration with Mr. Trystan Magnuson and Dr. David Magnuson at the University of Louisville. Without their input, this module would not be available to researchers worldwide.



- Acquire accurate data for the iliac crest & hip and ankle & toe
- Accurately estimate the knee position based on bone lengths
- Accurately estimate the known position of the hip & ankle
- Assign lengths to the femur and tibia
- Can use estimates based on age, weight, gender-matched controls
- Calculate the position of the knee and the two angles which are critical to understanding the hindlimb kinematic (iliac crest – hip – knee (hip angle) and hip – knee – ankle (knee angle)
- Acquire phase relationships between the hip, knee and ankle angles during swimming and walking

"In our specific approach we are using kinematics to assess the movement of the hind limbs of rodents following spinal cord injury. We use both walking and swimming. One of the major hurdles that we have had to overcome is the inaccuracy of marking the skin to approximate the position of the knee joint during swimming. The range of motion is greater than during over ground walking and the data we collected by marking the skin over the knee was obviously flawed and certainly was not useable to assess changes following injury and/or treatment or rehabilitation. We are able to acquire accurate data for the iliac crest and hip because they are relatively static compared to the overlying skin, and from the ankle and toe because they are covered by tight skin. So, we set out to develop a way to accurately estimate the knee position based on bone lengths and the known positions of the hip and ankle in 2-dimensions, based in part on previously published work (S. Rossignol, U. of Montreal). This program allows us to assign lengths to the femur and tibia (based on actual post-mortem measurements) or to use estimates based on age, weight and gender-matched controls, and to calculate the position of the knee and the two angles critical to understanding the hind limb kinematics, the iliac crest – hip – knee (hip angle) and hip – knee – ankle (knee angle). Of particular importance is the phase relationship between the hip, knee and ankle angles during swimming and walking. Following spinal cord injury, the complex phase relationship seen in normal animals breaks down until all three joints are moving almost in phase. This clearly represents an important feature that we would not be able to address without this piece of software."

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