• Animation: representations
  o Sequence of 3D meshes that represent the same object over time
• An animation could have:
  o Deformations (bending, etc)
  o Translations, Scaling
  o Merging of connected components
  o Topology changes
  o Increase/Decrease in detail, resolution
• Numbers
  o For each frame, we have to store
    ▪ Connectivity
    ▪ Geometry
  o We can use compression techniques
• Sampling
  o Interpolation vs. key frames
  o Choice of key frame given raw animation
    ▪ Over regular interval
    ▪ Over relative motion
      ▪ Component movement
      ▪ Joint movement
  o Keep the animation smooth
    ▪ Geomorphing
• Dynapack (’03)
  o Use prediction techniques that exploit space and time coherence
  o Lossless compression except for quantization
  o Fast
  o Only works with constant connectivity
• Extended Lorenzo Predictor (ELP)
  o Parallelogram predictor
  o Perfect for translations
  o Not good for rotation and scaling
• Improving ELP
  o Coefficient based approach
    ▪ Make use of local coordinate system
    ▪ The set of coefficients remain the same
  o Replica solution
    ▪ Use the normal of the original plane does not work
      ▪ Rotation in next frame is not captured
      ▪ Losing information
    ▪ Normal grows too fast, need to be scaled back
    ▪ Translation, rotation and scaling are taken care of after correction
However, improvement is not significant in tests

- Barycentric coordinates
  - Extend to 3D
    - Use volume of a tetrahedron

- Jed Lengyel’s approach (’99)
  - Problems
    - Lost of generality
    - How to identify the set of vertices that go together?
      - May change overtime

- Marc Alexa’s Approach (’00)
  - Use the animation as a whole new dimensional space
  - All the frames together in a huge matrix, decompose with PCA
    - Principle component analysis
      - Typical dimensionality reduction technique
      - Finds projections where data creates most variance
      - Good for reconstruction
        - Lossy compression
        - Useful for progressive transmission
    - Problem
      - Computationally expensive
      - Hard to control error level

- Geometry Images
  - Take advantage of image techniques to do animation compression

- Research in Dynapack
  - New features:
    - Simplification of the animation
    - Geomorphs, new prediction
    - Segmentation
    - Animation Simplification

- How to simplify an animation
  - Frame by frame
    - Loss of coherence
  - Identify moving components

- Hard