Bone Anisotropy Mapping

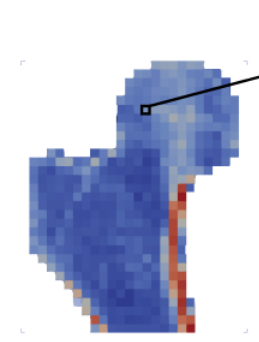
Jarunan Panyasantisuk
Joao Rivera
Rajan Gill
Ryan Cherifa

Project Presentation, How to Write Fast Numerical Code, 27 May 2019

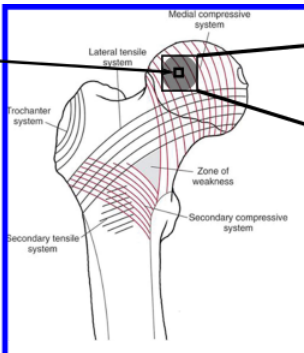
ETH
Eidgenössische Technische Hochschule Zürich
Swiss Federal Institute of Technology Zurich

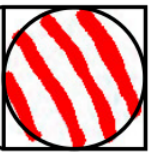
Algorithms

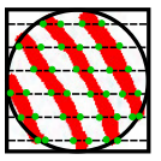
Algorithms

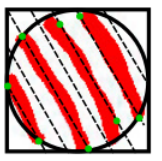


rotation matrix



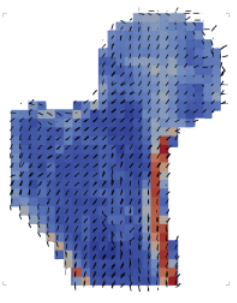


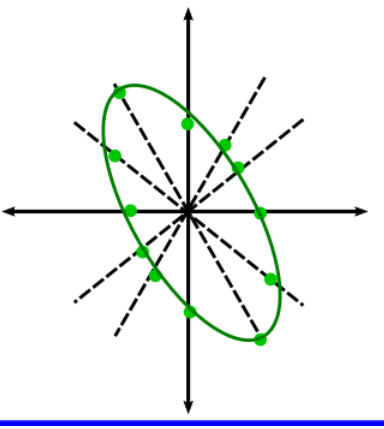




Low resolution image

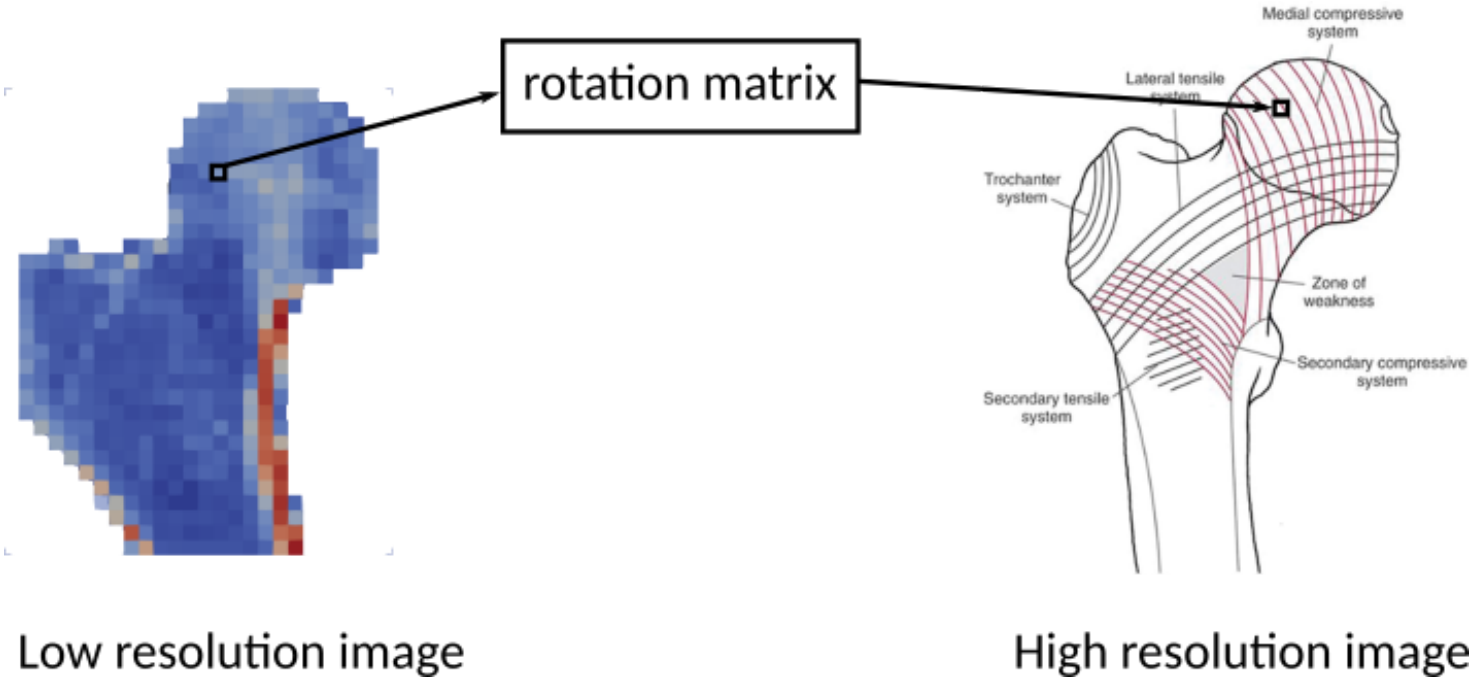
High resolution image





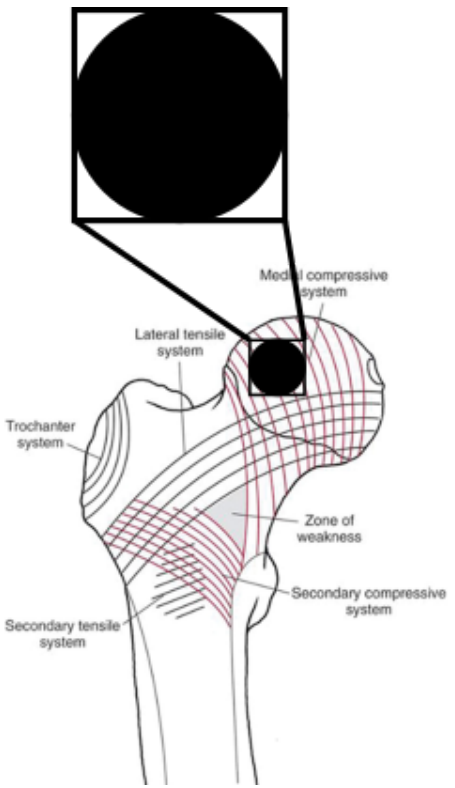
Algorithms

Coordinate mapping



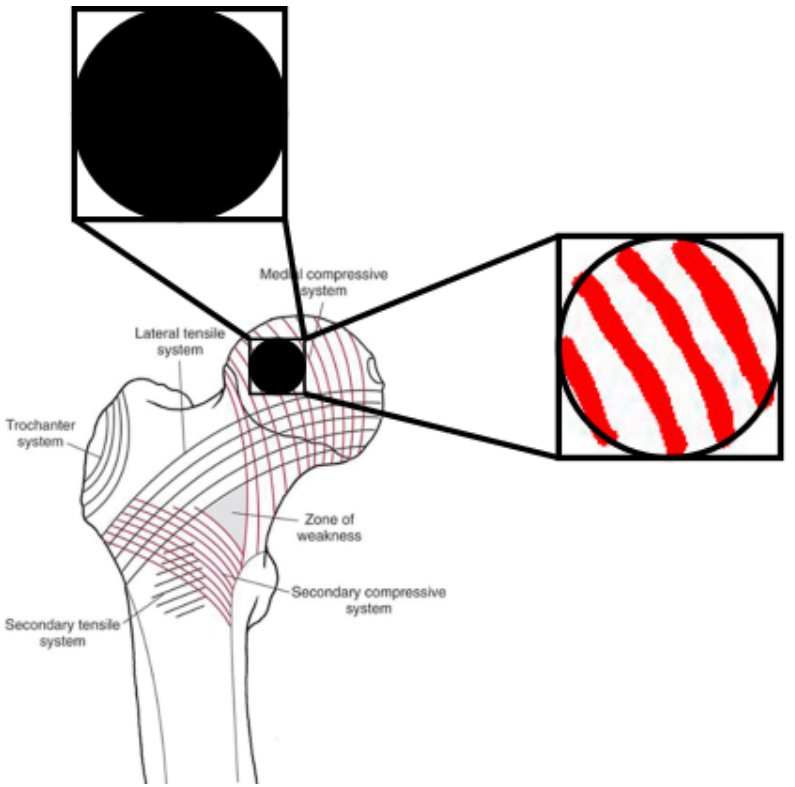
Algorithms

Region extraction



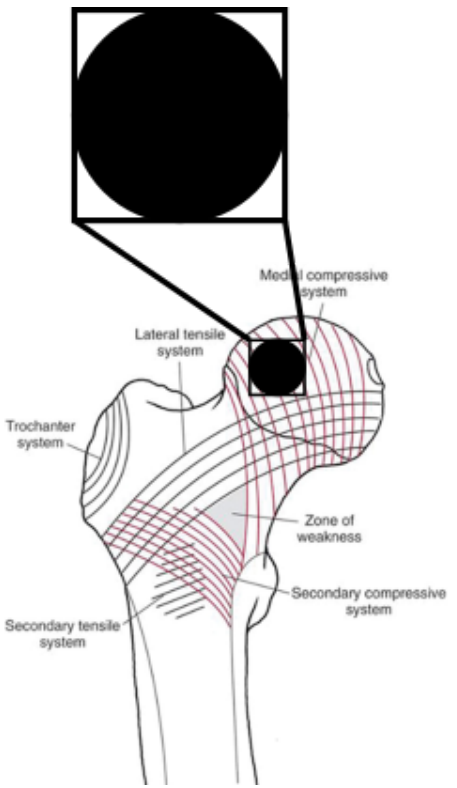
Algorithms

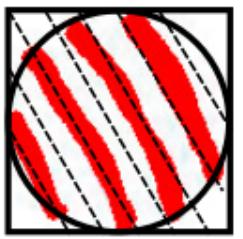
Region extraction



Algorithms

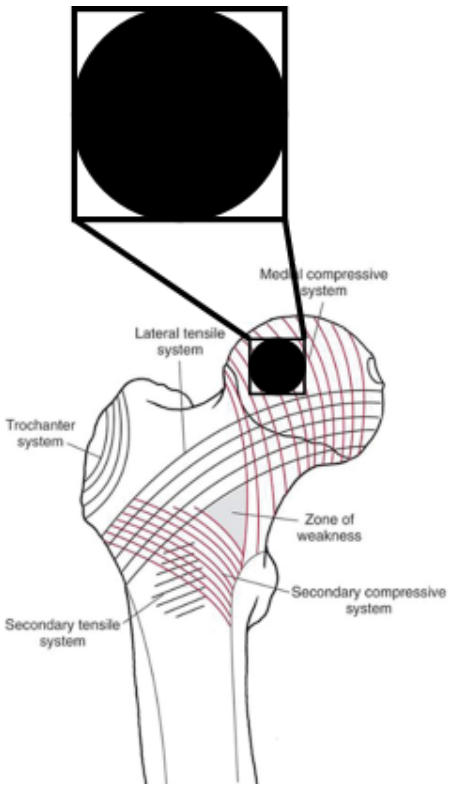
Mean intercept length (MIL) method

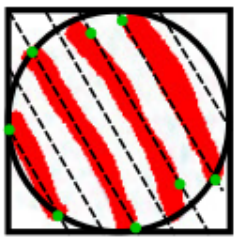


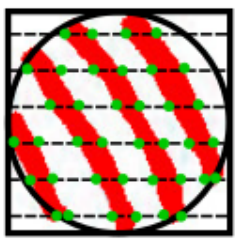


Algorithms

Mean intercept length (MIL) method

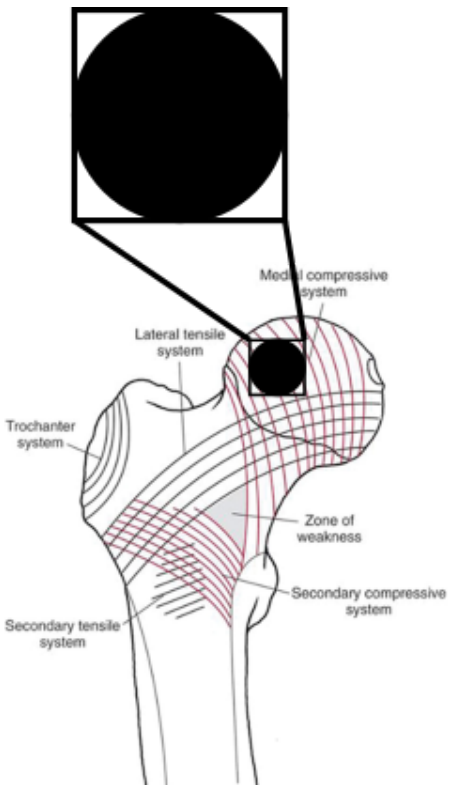


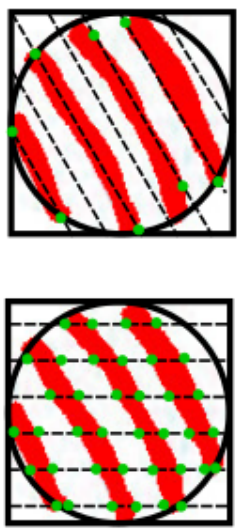


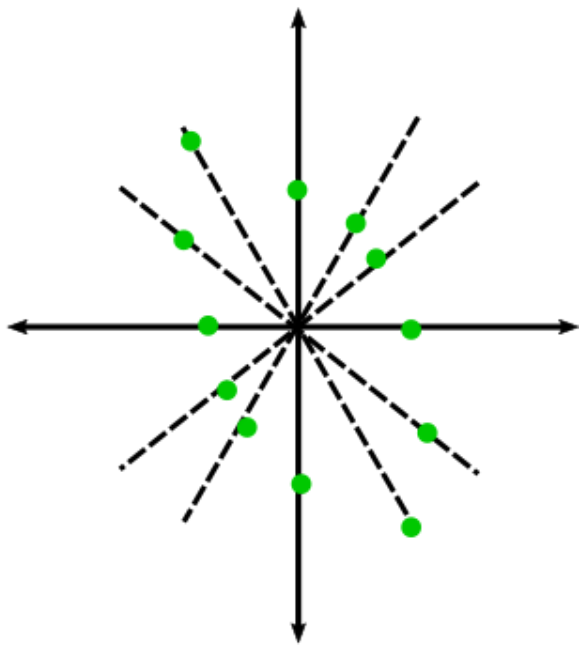


Algorithms

Ellipsoid fitting

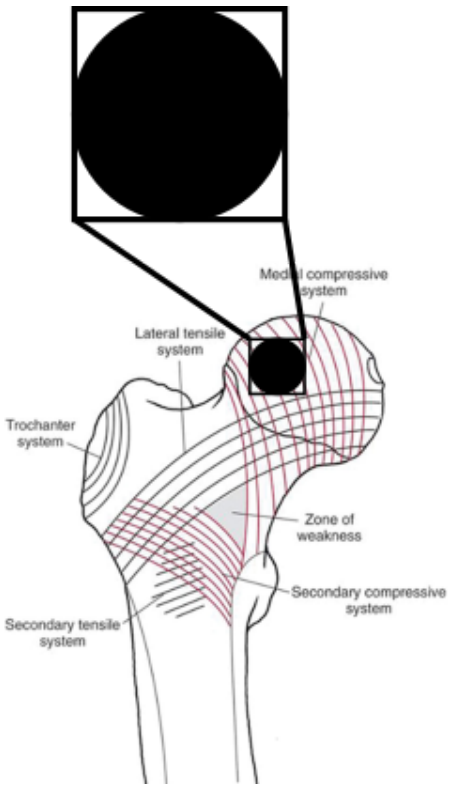


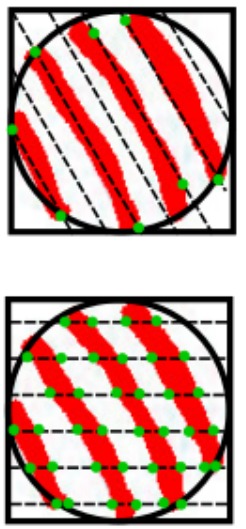


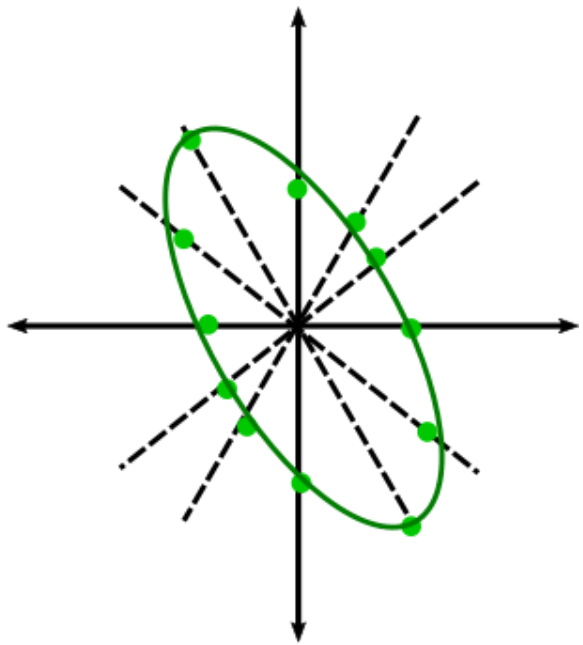


Algorithms

Ellipsoid fitting

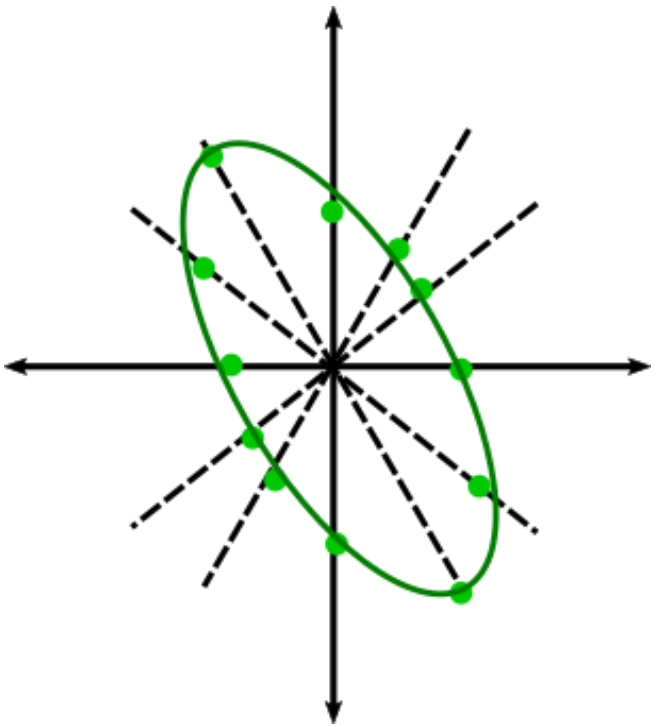






Algorithms

Ellipsoid fitting

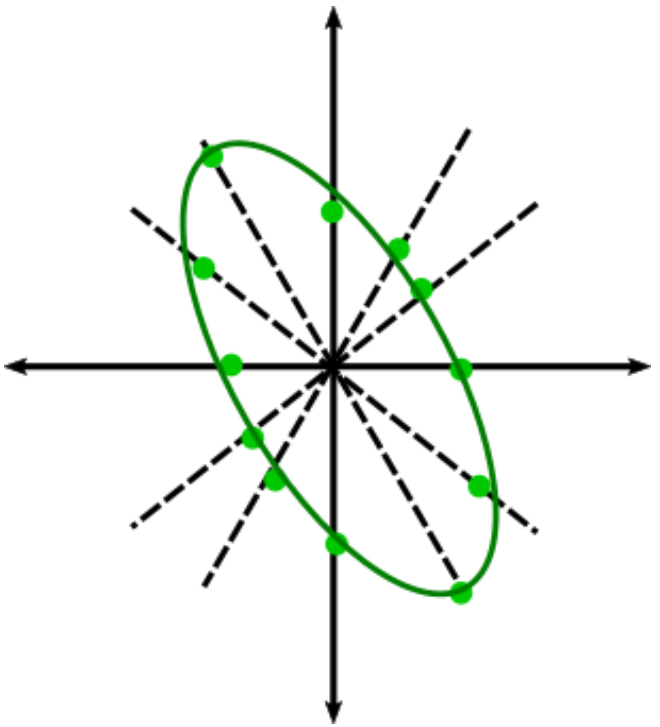


Fabric Tensor:

$$\begin{pmatrix} q_1 & q_2 & q_3 \\ q_4 & q_5 & q_6 \\ q_7 & q_8 & q_9 \end{pmatrix}$$

Algorithms

Eigendecomposition



Fabric Tensor:

$$\begin{pmatrix} q_1 & q_2 & q_3 \\ q_4 & q_5 & q_6 \\ q_7 & q_8 & q_9 \end{pmatrix}$$

Eigenvalues:

$$l_1, l_2, l_3$$

Eigenvectors:

$$\begin{pmatrix} m_1 & m_2 & m_3 \\ m_4 & m_5 & m_6 \\ m_7 & m_8 & m_9 \end{pmatrix}$$

Algorithms summary

Coordinate mapping

Region extraction

3D arrays

MIL calculation

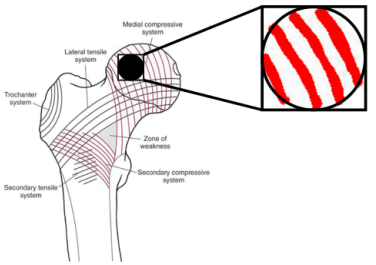
1D array

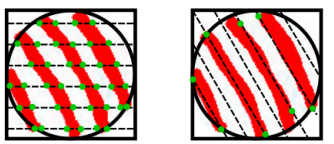
Ellipsoid fitting

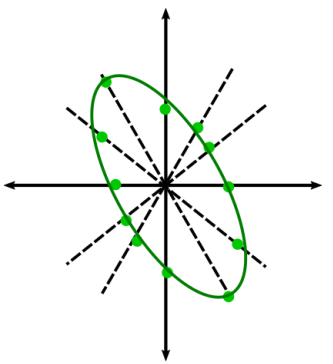
3x3 matrix

Eigendecomposition

3 eigenvalues
3 eigenvectors

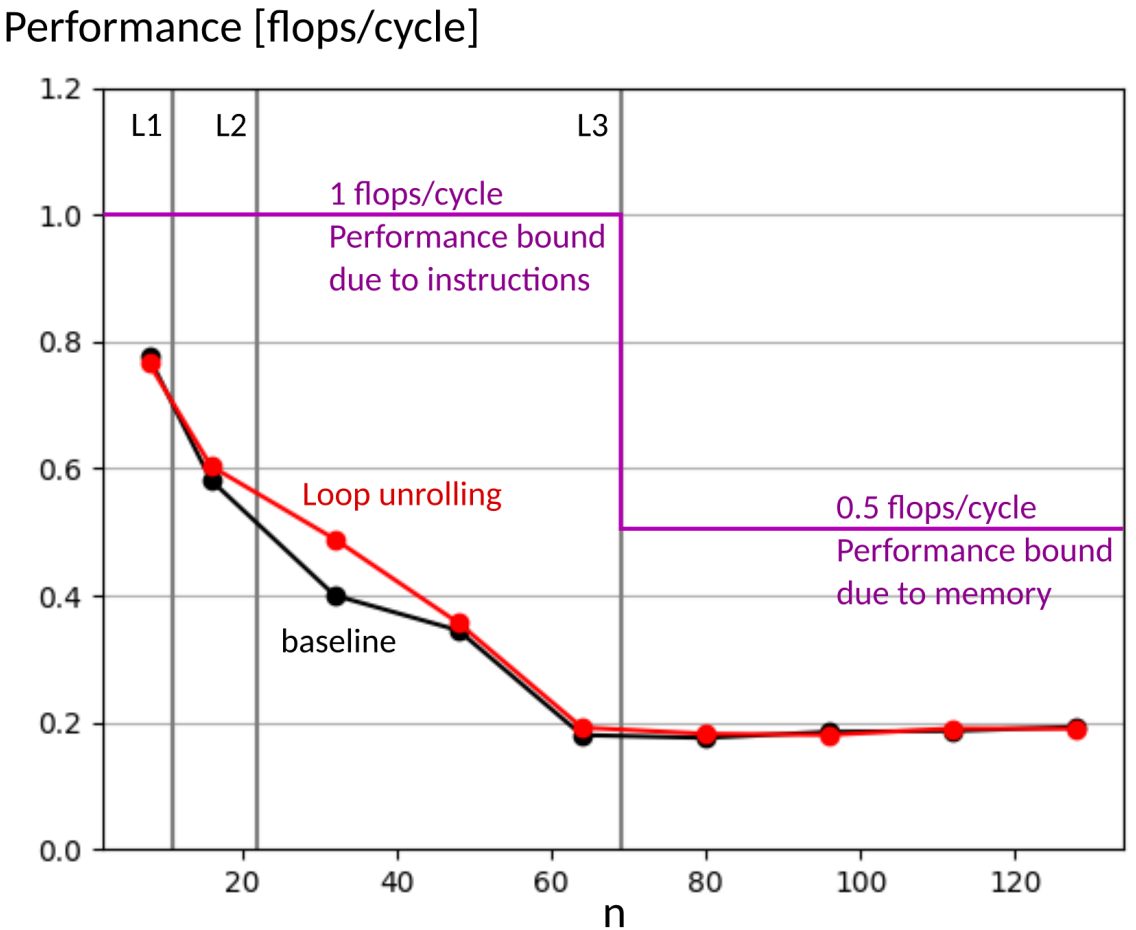






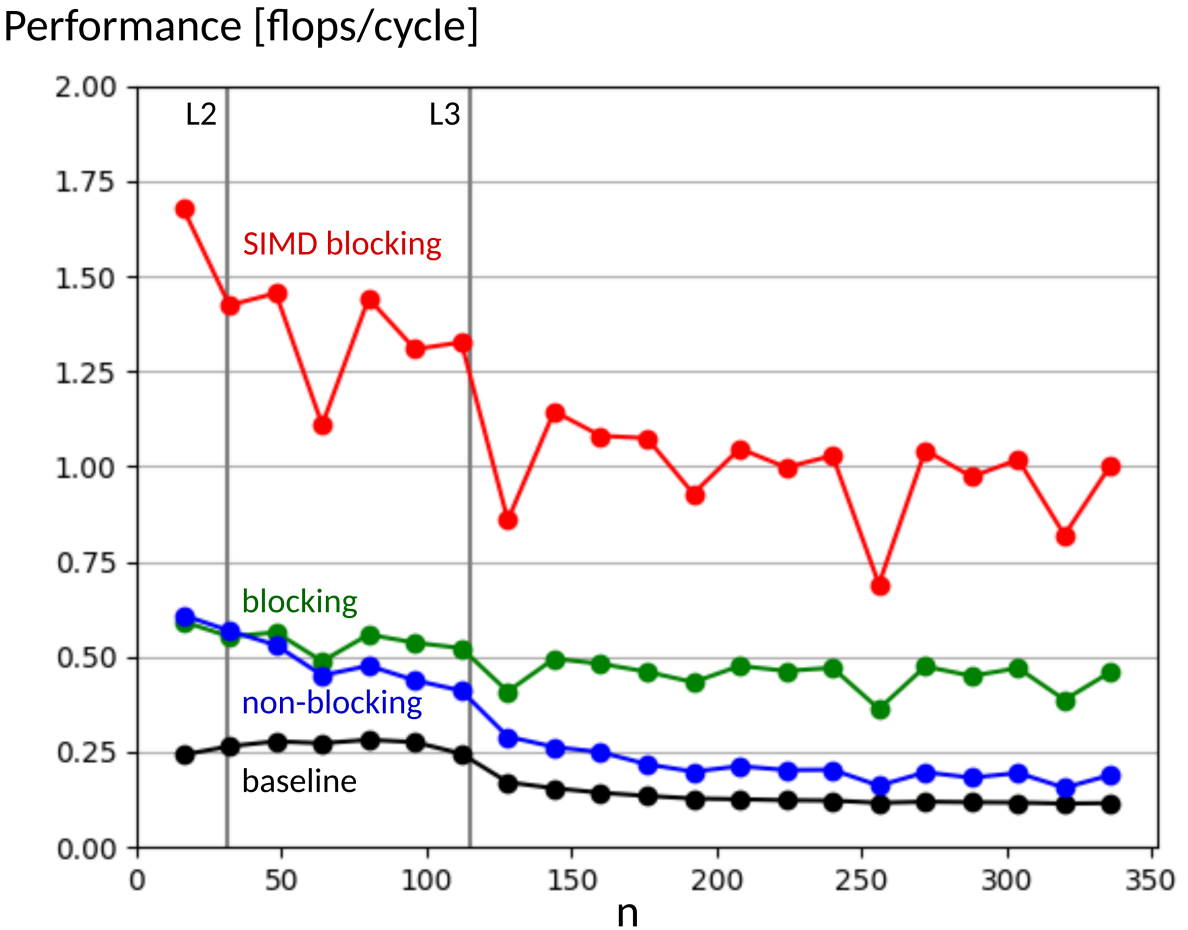
Region extraction

Region extraction

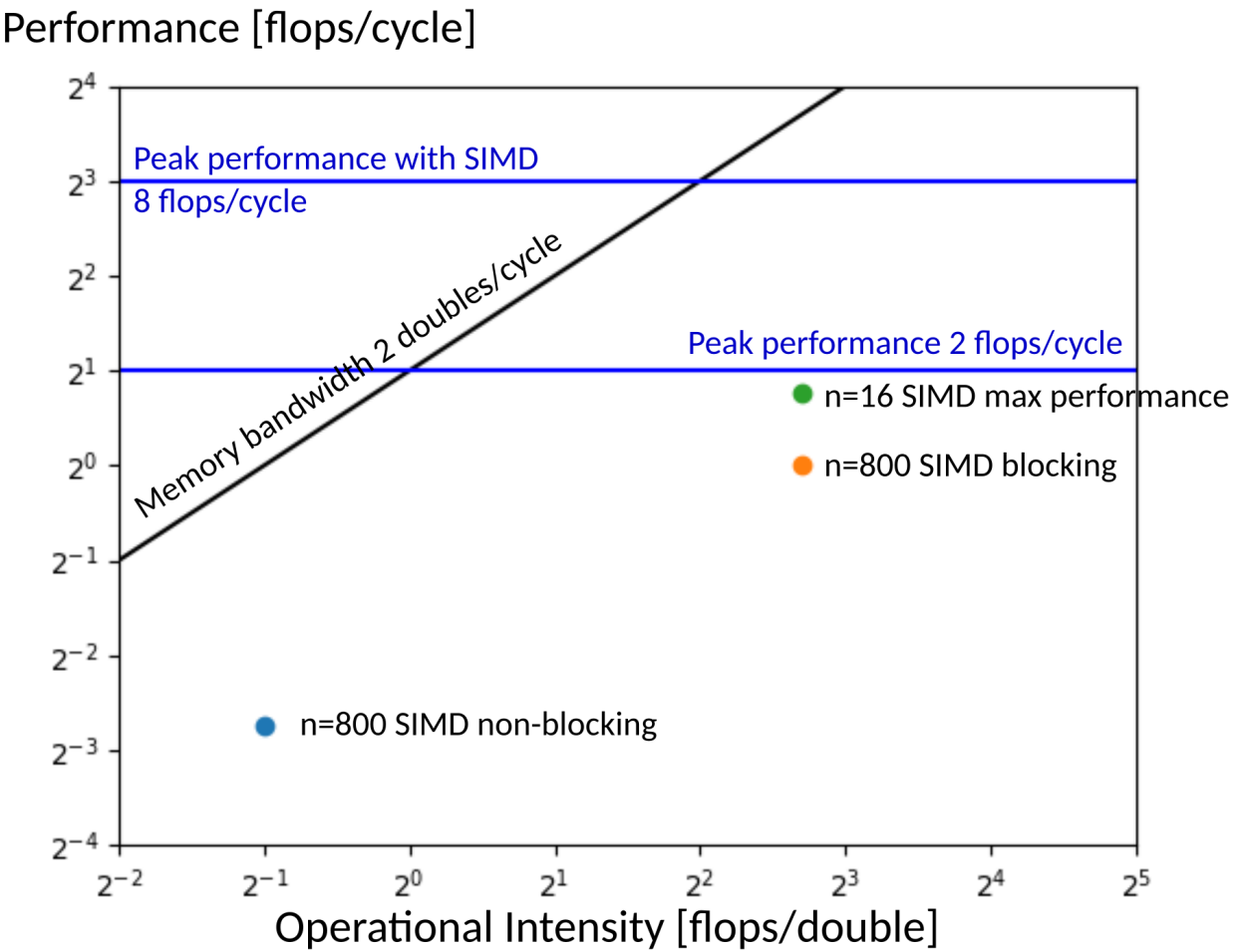


MIL calculation

MIL calculation

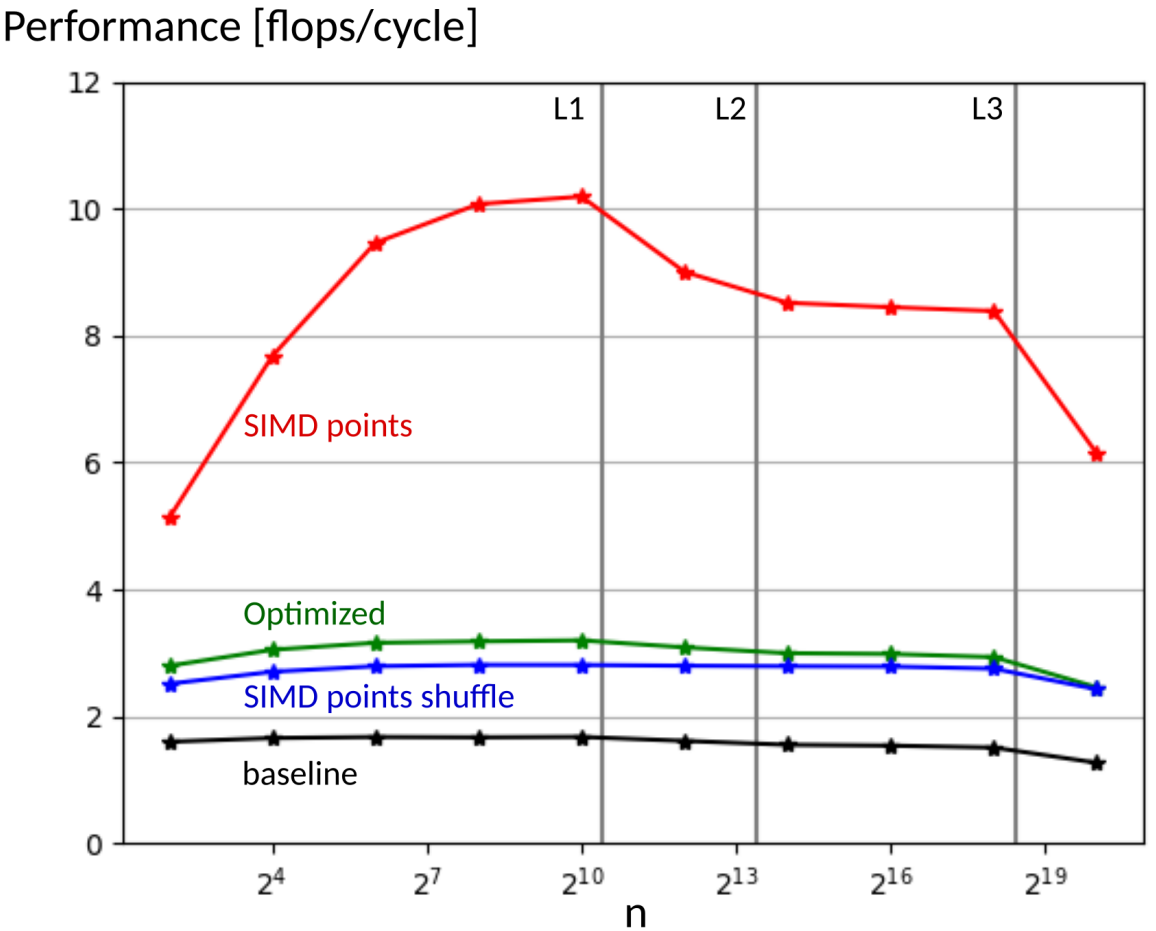


MIL calculation



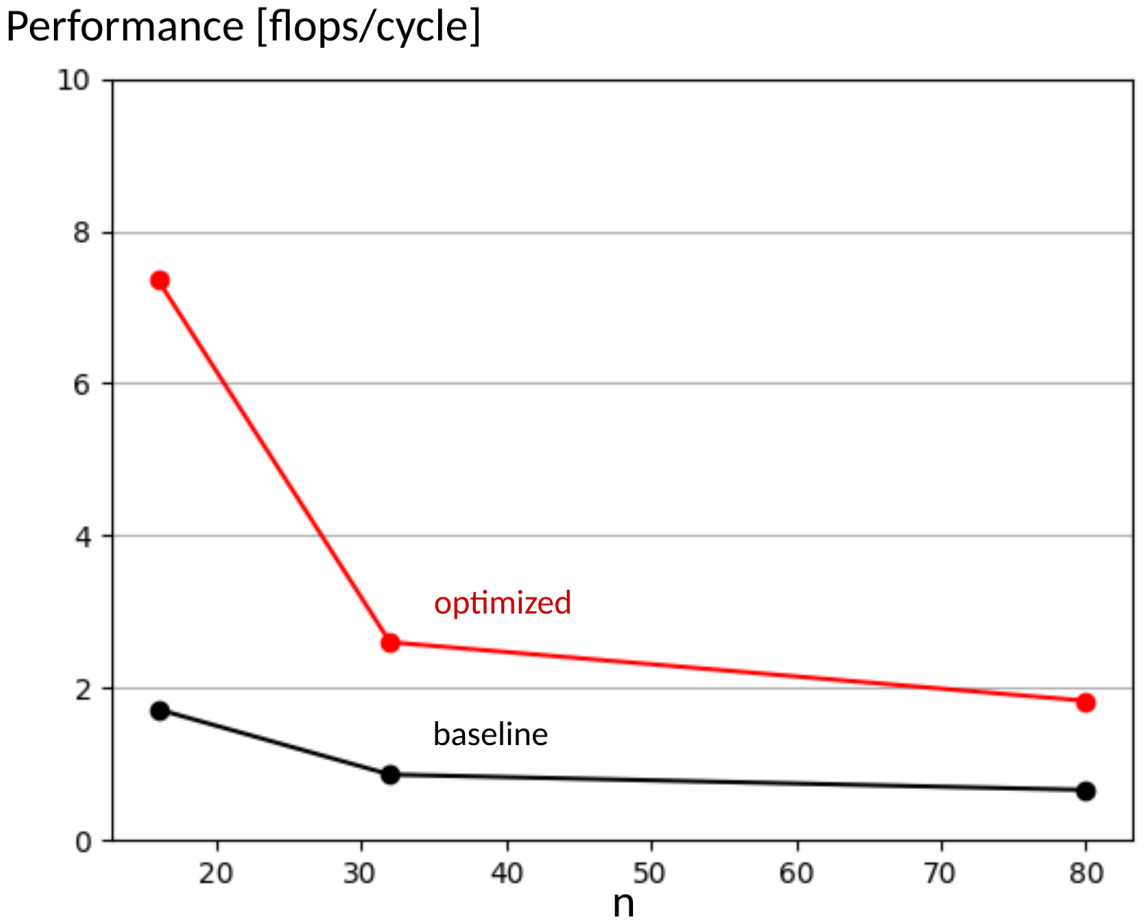
Ellipsoid fitting

Ellipsoid fitting



Overall performance and results

Overall performance



Results