Image Correlation

Dennis Gardner

September 14, 2016

1 Papers from Giulia

On Aug. 30th, 2016 Giulia sent me two papers on correlation techniques. These papers may illuminate a path to find a signal in the pumped Ni circles that Liz made (Ni sample B). She sent me one paper from Nano Letters [1] and one from Science [2]. "The analysis reported in Nano Letters is particularly of interest for our case." - Giulia

1.1 Nanoscale mechanical drumming visualized by 4D electron microscopy

I like this paper [1] because I think it's well written and clear. Here is how they define the cross-correlation:

$$\gamma(t'; t) = \frac{\Sigma_{x,y} C_{x,y}(t) C_{x,y}(t')}{\sqrt{\Sigma_{x,y} C_{x,y}(t)^2 \Sigma_{x,y} C_{x,y}(t')^2}} \tag{1.1}$$

Just to make sure, I can Eq. 1.1.

References

[1] Oh Hoon Kwon, Brett Barwick, Hyun Soon Park, J. Spencer Baskin, and Ahmed H. Zewail. Nanoscale mechanical drumming visualized by 4D electron microscopy. *Nano Letters*, 8(11):3557–3562, 2008.

[2] Brett Barwick, Hyun Soon Park, Oh-Hoon Kwon, J. Spencer Baskin, and Ahmed H. Zewail. 4D Imaging of Transient Structures and Morphologies in Ultrafast Electron Microscopy. *Science*, 322(11):1227 – 1231, 2008.

1.2   Leftover from template

Nam dui ligula, fringilla a, euismod sodales, sollicitudin vel, wisi. Morbi auctor lorem non justo. Nam lacus libero, pretium at, lobortis vitae, ultricies et, tellus. Donec aliquet, tortor sed accumsan bibendum, erat ligula aliquet magna, vitae ornare odio metus a mi. Morbi ac orci et nisl hendrerit mollis. Suspendisse ut massa. Cras nec ante. Pellentesque a nulla. Cum sociis natoque penatibus et magnis dis parturient montes, nascetur ridiculus mus. Aliquam tincidunt urna. Nulla ullamcorper vestibulum turpis. Pellentesque cursus luctus mauris.

$$
\begin{aligned}
(x+y)^3 &= (x+y)^2(x+y) \\
&= (x^2 + 2xy + y^2)(x+y) \\
&= (x^3 + 2x^2y + xy^2) + (x^2y + 2xy^2 + y^3) \\
&= x^3 + 3x^2y + 3xy^2 + y^3
\end{aligned}
\tag{1.2}
$$

Phasellus viverra nulla ut metus varius laoreet. Quisque rutrum. Aenean imperdiet. Etiam ultricies nisi vel augue. Curabitur ullamcorper ultricies

1.3   Heading on level 2 (subsection)

Lorem ipsum dolor sit amet, consectetuer adipiscing elit.

$$
A = \begin{bmatrix} A_{11} & A_{21} \\ A_{21} & A_{22} \end{bmatrix}
\tag{1.3}
$$

Aenean commodo ligula eget dolor. Aenean massa. Cum sociis natoque penatibus et magnis dis parturient montes, nascetur ridiculus mus. Donec quam felis, ultricies nec, pellentesque eu, pretium quis, sem.

1.3.1   Heading on level 3 (subsubsection)

Nulla malesuada porttitor diam. Donec felis erat, congue non, volutpat at, tincidunt tristique, libero. Vivamus viverra fermentum felis. Donec nonummy pellentesque ante. Phasellus adipiscing semper elit. Proin fermentum massa ac quam. Sed diam turpis, molestie vitae, placerat a, molestie nec, leo. Maecenas lacinia. Nam ipsum ligula, eleifend at, accumsan nec, suscipit a, ipsum. Morbi blandit ligula feugiat magna. Nunc eleifend consequat lorem. Sed lacinia nulla vitae enim. Pellentesque tincidunt purus vel magna. Integer non enim. Praesent euismod nunc eu purus. Donec bibendum quam in tellus. Nullam cursus pulvinar lectus. Donec et mi. Nam vulputate metus eu enim. Vestibulum pellentesque felis eu massa.

Heading on level 4 (paragraph)   Suspendisse vel felis. Ut lorem lorem, interdum eu, tincidunt sit amet, laoreet vitae, arcu. Aenean faucibus pede eu ante. Praesent enim elit, rutrum at, molestie non, nonummy vel, nisl. Ut lectus eros, malesuada sit amet, fermentum eu, sodales cursus, magna. Donec eu purus. Quisque vehicula, urna sed ultricies auctor, pede lorem egestas dui, et convallis elit erat sed nulla.

Donec luctus. Curabitur et nunc. Aliquam dolor odio, commodo pretium, ultricies non, pharetra in, velit. Integer arcu est, nonummy in, fermentum faucibus, egestas vel, odio.

2   LISTS

2.1   EXAMPLE OF LIST (3*ITEMIZE)

- First item in a list
  - First item in a list
    * First item in a list
    * Second item in a list
  - Second item in a list
- Second item in a list

2.2   EXAMPLE OF LIST (ENUMERATE)

1. First item in a list
2. Second item in a list
3. Third item in a list