

Proof Edits

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T-SP-13946-2012 - IEEE Transactions on Signal Processing - “The Performance of a Matched Subspace Detector that Uses Subspaces Estimated from Finite, Noisy, Training Data”

To whom it may concern,

Could you please make the following changes to the proof

- Please replace “an” in the title with “a”. It should read “The Performance of a Matched Subspace Detector That Uses Subspaces Estimated From Finite, Noisy, Training Data”.
- Page 1, Introduction, Third paragraph. The second reference to [13] should read “[13, Table 10.1, pp. 121],”. Please delete the extra brackets and place the comma on the outside of bracket.
- Page 2, Figure 1, If the labels “Stochastic setting” and “Deterministic setting” cannot be placed directly under each subfigure, please remove them from the last line of the caption.
- Page 2, Figure 2. The reference to equation (19) in the caption should reference equation (13).
- Page 3, Section II.A, can “ $\sigma_1 > \sigma_2 > \dots > \sigma_k > 0$ ” all be on one line?
- Page 3, Section II.B, please place both equation lines of equation (1) in the same column. i.e. please don’t split \hat{U} and $\hat{\sigma}_i^2$ in different columns.
- Page 4 - Can the equation labels for (7), (8), (10), and (12) be vertically centered with their respective boxed equation? They are all a little low.
- Page 5, Section IV.A - Can the two lines of the indented statement “Design a new detector...subspace estimation accuracy.” please be left aligned to each other (but still indented from the normal paragraph). Currently the first line is extra indented.
- Page 5, first paragraph in second column starting with “The detector derivations...” - This is a continuation of the previous paragraph. Please delete the indentation.
- Page 6 - Please vertically center the equation label (16) with the boxed equation. It is a little low.
- Page 6, There is a “1)” immediately before the Claim 5.1. Please remove “1)”.
- Page 7, equation (18) - Can the split of the equation happen after the “and” so that the second line of the equation is “ $\hat{w}|H_1 \sim \mathcal{N}...$ ”. Can the two lines then be horizontally centered?
- Page 7, Please vertically center the equation label (20) with the boxed equation. It is a little low.
- Page 7, Section VI.B, the equation “ $\Lambda(\hat{w})...$ ”. Can you please make this equation fit on one line by doing the following: Place “ $\Lambda(\hat{w}) =$ ” inline immediately after “becomes”, so it reads “becomes $\Lambda(\hat{w}) =$ ”. The remaining equation should fit on one line. Please remove the \times that was added to the equation at the point at which it was split up.

- Page 8, first column, first equation beginning with “ $\Lambda(\hat{w})$ ”. Please remove the \times in the middle of this equation.
- Page 8, equation (22). Please don’t split the two lines of equation (22) across columns. Please have the P_F and P_D immediately following one another.
- Page 8, equation (23). Please split this equation after the comma and horizontally align the equations so it looks like.

$$\Lambda(\hat{w})|H_0 \sim \sum_{i=1}^{\hat{k}} d_i \chi_{1i}^2,$$

$$\Lambda(\hat{w})|H_1 \sim \sum_{i=1}^{\hat{k}} d_i (\sigma_i^2 |\langle u_i, \hat{u}_i \rangle|^2 + 1) \chi_{1i}^2$$

- Page 9, equation (26). Can both lines of the equation be horizontally centered?
- Page 9, section VIII.B, second column, first paragraph. The phrase “plot three empirical ROC curves for $n = 502001000$ ” should read “plot three empirical ROC curves for $n = 50, 200, 1000$ ”. Please add the commas between the numbers.
- Page 10, Figure 3, caption. Please remove “(a) $k = 2, c = 1$ (b) $k = 4, c = 10$ ” from the last line of the caption.
- Page 10, Figure 4, The reference to equation (22) should be equation(16).
- Page 10, Figure 4, caption. Please remove “(a) Stochastic (b) Deterministic” from the last line of the caption.
- Page 11, Figure 5, caption. Please remove “(a) $m = 5000$ (b) $m = 250$ ” from the last line of the caption.
- Page 11, first full paragraph of first column. The sentence “Fig. 5 chooses $20m = n$ so that $c = 20\dots$ ” should begin “Fig. 5(b)…”.
- Page 11, Figure 6, caption. The reference to (19) should be (13).
- Page 11, Figure 6, caption. Please remove “(a) Stochastic (b) Deterministic ” from the last line of the caption.
- Page 12, Section IX, second paragraph. The sentence “In setting where a practitioner might play-it-safe and set $\hat{k} > \hat{k}_{\text{eff}}$, the performance loss is significant” should read “In setting where a practitioner might play-it-safe and set $\hat{k} > \hat{k}_{\text{eff}}$, the performance loss is significant”. Replace “in” with “is” in the second to last word.
- Page 13, equation (27). There are two dots after this equation. There should only be one period. The equation label is also low.
- Page 13, equation (28). There are two dots after this equation. There should only be one period. The equation number is also low.
- Page 13, equation (30). Can you please make the break before the diag so that $M_n \left(\hat{\lambda}_i \right) \xrightarrow{\text{a.s.}}$ is on the first line, leaving $\text{diag}(\dots)$ on the second line?

- Page 13, second column, second to last sentence. Please change “...and the smallest gap between k successive eigenvalues is at least as large as ...” to “...and the largest gap between k successive eigenvalues is at most $O(\dots)$ ”. Please replace “smallest” with “largest” and “least as large as” with “most”
- Page 14, Reference [11] new bibtex entry:
`@inproceedings{mcwhorter2003matched, title={Matched subspace detectors for stochastic signals}, author={McWhorter, L. T. and Scharf, L. L.}, booktitle={Proc. 11th Ann. Workshop on Adaptive Sensor Array Process. (ASAP)}, year={2003}, organization={Lexington, MA, Mar. 11-13} }`
- Page 14, Reference [20] new bibtex entry:
`@article{benaych2011eigenvalues, title={The eigenvalues and eigenvectors of finite, low rank perturbations of large random matrices}, author={Benaych-Georges, Florent and Nadakuditi, Raj Rao}, journal={Advances in Mathematics}, volume={227}, number={1}, pages={494–521}, year={2011}, publisher={Elsevier} }`
- Page 14, Reference [22] new bibtex entry:
`@inproceedings{asendorf2011improving, title={Improving and characterizing the performance of stochastic matched subspace detectors when using noisy estimated subspaces}, author={Asendorf, Nicholas and Nadakuditi, Raj Rao}, booktitle={Signals, Systems and Computers (ASILOMAR), 2011 Conference Record of the Forty Fifth Asilomar Conference on}, pages={1893–1897}, year={2011}, organization={IEEE} }`

Thank you very much. Please do not hesitate to email or call me directly at asendorf@umich.edu or 443-605-3018.

Sincerely,

The authors