



SDI Review Form 1.6

Journal Name:	British Journal of Mathematics & Computer Science
Manuscript Number:	Ms_BJMCS_26476
Title of the Manuscript:	A Metric for Data Set Comparison Via QR-Factorization
Type of the Article	Method Article

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PART 1: Review Comments

	Reviewer's comment	Author's comment (if agreed with reviewer, correct the manuscript and highlight that part in the manuscript. It is mandatory that authors should write his/her feedback here)
Compulsory REVISION comments	There are many serious flaws in the section 2 of this article. These flaws make the properties of the Q-metric untrusted. In page2, "If A is of full rank, then this factorization is unique,". This is not true for QR factorization, even the matrix is full rank. For example, the sign of diagonal term inverses than the corresponding column of Q inverses. If the author wants to make the QR-factorization unique, he must have additional criterion that the diagonal terms of R matrix are positive. $Q^*Q = I$ is always true when Q comes from a QR factorization (even though the matrix is not full rank). If the author wants to say a projection of A onto $S(A)$, the projection is QQ^*, not Q^*Q. If A and B are both full rank, then $S(A) = S(B)$. Thus, this sentence "two matrices A and B are the same provided that each can be perfectly projected onto the other, that is, if and only if $S(A)=S(B)$" is totally wrong. No matter A and B are full rank matrix or not, $S(A)=S(B)$ can not imply $A=B$. Therefore, using $\mu(S(A),S(B))$ as a metric has big problem.	1. This was an oversight in composition. The reviewer is correct and a statement requiring $r_{jj}>0$ has been added. 2. Yes, which in part motivated the work. 3. The reviewer is correct. This was inappropriate use of terminology, as "projection" does have a very precise meaning. It has been replaced with "mapping" or "mapped" as appropriate. We note, however, that we never intended to make the claim that $A=B$ but that the underlying structure of A is equivalent to the underlying structure of B, and in that view, they are equivalent. It certainly does not imply that $A=B$. We believe that the correction should help clarify the validity of the identity property.



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	For example, A and B are full rank, A is not equal to B. Then Q_A is not equal to Q_B. We have $S(A) = S(B)$, but $\mu(S(A), S(B)) \neq 0$. Therefore, the identity property faults. In page 104, equation (3.7) and (3.8), A belongs to $R^{m \times n}$ and B belongs to $R^{m \times n}$. When m is not equal to n, these two matrix could not apply the matrix multiplication. Equation (3.9) will fault when m is not equal to n. The multiplication will not be applied when Q comes from the economical QR-factorization. When the identical property faults, then the triangle inequality also faults. Fortunately, the number of data in this paper usually higher than the data dimension. That is matrix A and matrix B are usually full rank. Thus, the 2-D experiment works.	We believe that the reviewer may have misinterpreted something in this item. If Q_A is not equal to Q_B, then $S(A)$ is not equal to $S(B)$ by the definition that we use. Also, there exists a matrix A that is not equal B, yet $Q_A = Q_B$, provided that R_A does not equal R_B. As an example, if $B = 5A$, then $Q_A = Q_B$, while $R_B = 5R_A$. The scale independence is actually one of the primary features of the metric. The reviewer is correct. The issue on pg 104 has been corrected. It was general information on matrix transposes. The extracted orthonormal matrices are required to be square. The introduction was amended to require that Q_i be a square matrix, which was originally intended, though the multiplication can occur so long as A and B are the same size (same number of data points). We agree that it is required that there be more data points than dimension. Without fault of the identity, the triangle inequality follows as presented.
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<u>Minor</u> REVISION comments	It is true that Q-metric is not translation invariant. However, we can modify the Q-metric by an affine transform to make the new metric translation invariant. Solving the affine transform is an optimization problem. This can be the further research of this paper.	This is true and we are certainly considering it for future work.
<u>Optional/General</u> comments		