



جامعة الموصل
كلية علوم الحاسوب والرياضيات

اختيار أفضل حزمة باستخدام تقنيات هجينة وتطبيقها على بيانات الاستشعار عن بعد

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رسالة ماجستير
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مدرس

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الملخص

تلعب عملية اختيار أفضل حزمة من بين حزم بيانات الاستشعار عن بعد دوراً مهماً وأساسياً في معالجة الصور متعددة الأطياف والفائقة الطيفية (Hyperspectral and Multispectral Images) وذلك بسبب الترابط الموجود بينها.

تم في هذا العمل بناء وتنفيذ خوارزمية جديدة لغرض اختيار أفضل حزمة والتقليل من الأبعاد العالية (Dimensionality Reduction) لصور الاستشعار عن بعد اعتماداً على خوارزميات متعددة وهي خوارزمية تحليل المركبات الأساسية (Principle Component Analysis) والتحوير المويجي (Wavelet Transform) وخوارزمية التصنيف K- Means ثم تنفيذ كل خوارزمية لوحدها ودراسة نتائجها ثم دمجها في الخوارزمية المقترحة.

و تم تطبيق الخوارزميات على مجاميع عدة من الصور متعددة الأطياف لمتحسس راسم الخرائط الموضوعية (Thematic Mapper, TM) وكانت المجموعة الأولى هي TM والمجموعة الثانية هي SS والمجموعة الثالثة هي PP ، في خوارزمية تحليل المركبات الأساسية وبعد إيجاد مصفوفة التباين/ التباين المشترك (Variance /Covariance Matrix) للحزم المراد معالجتها والحصول على متجه أيكن وتمثل أعلى قيمة في متجه الايكن أفضل حزمة. وبتطبيق الخوارزمية على المجاميع الثلاثة تبين أن الحزمة السابعة هي أفضل حزمة لمرئيات TM والحزمة الثانية هي أفضل حزمة لمرئيات SS والحزمة الخامسة هي الأفضل لمرئيات PP حيث كانت قيمة الايكن لها أكبر قيمة، (مع الأخذ بنظر الاعتبار عزل الحزمة السادسة الحرارية في المجاميع الثلاثة).

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The Best Band Selection Using Hybrid Techniques Applied on Remote Sensing Data

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Abstract

The best band selection from remote sensing image plays an important role in multispectral and hyperspectral remote sensing image processing due to the intercorrelation between them. In this work , A new Algorithm has been established and executed for the selecting the best band and lessening high dimension of remote sensing data depending on multi algorithms, it is principle component analysis and wavelet transform and k-mean classifications , each on carried out and its results are studied irrespective of other , then combining them in the proposed algorithms. The algorithm was applied on many groups on multispectral images for the thematic mapper sensor, the first group was TM and the second group was SS and the third group was PP. In the principle component analysis algorithm, and after find variance /covariance matrix for the processing bands and find Eigen vector, the highest value in Eigen vector represents the best band. By applying it on three groups it concluded that the seventh band on the first group is the best one and the second band on the second group is the best one and the fifth band on third group is the best one which the value of its Eigen vector is the biggest one (regarding separating the sixth infrared band in the three groups).

By using wavelet transform algorithm for one level of analysis and selecting the best band according to the least value of mean square error.

The algorithm was applied on the three groups of remote sensing images. It concluded that the first band in the first group is the best one and the second band in the second group is the best one, and the second band in the third group is the best one according to MSE Scales, And to show the result of selecting the best, the k-means algorithm was used to classify images

By using K-mean classification algorithm .A new way was proposed and executed to determine centers which is an important matter in accurate classifications and specifying initial centers by finding the maximum value and minimum value and finding the mean between them until getting the wanted number of centers. The algorithm was applied on three groups of multispectral images .the classification was done on total number of bands to product one band out of it.

A new algorithm was proposed and executed depending on the previous three algorithms which applies the wavelet transform on multispectral images and finding the signal to noise ratio depending on variance of each band

And arranging it decendingly and then choosing the bands that have highest datas in order to select the best bands and apply the principle component analysis on it. After finding the Eigen vector from the algorithm and selecting the highest values from it, it will be classified.

From applying the proposed algorithm it has been clear that it is the best in accordance to applying .because it has shown high efficiency and accuracy in classification and in finding the best band.