STUDY ON STABILITY OF REFLECTANCE CHARACTERISTICS OF NATURAL FEATURES FOR CALIBRATING REMOTE SENSING DATA

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This work is dedicated with love and joy to
Mom, Dad, Brother, Sister, Husband,
for their supporting hands and loving care,
thank you for everything.
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The development of satellite technology in Malaysia is to ensure the availability of satellite imaging for the requirement of local remote sensing user. Apparently, low-quality images were produced from local remote sensing satellite. The vicarious calibration technique can be adopted to provide post-calibration opportunity to overcome this problem. However, this approach has constraints in defining well establishment target bodies. Currently, reflectance based calibration approach had been used in the measurement but using only several test sites as a calibration target. Malaysia with its tropical condition should be capable to provide natural bodies that stable enough to serve as calibration target. The main purpose of this study was to develop a spectral library for selected spatial features. The spectral library will serve as a reference for the calibration of the image data generated by the camera. Visible and near infrared (NIR) bands from Landsat 7 and SPOT XS images were used in this study to obtain reflectance value. These reflectance values were collected on the selected targets that are water bodies, dark dense vegetation, man-made features and cloud body. Reflectance curve of each features were compared with ASTER spectral library as reference. From the comparison it shows that reflectance curve from Landsat 7 and SPOT XS give almost similar reflectance curve with reference spectral library. The range of reflectance value for water features is from 0.018 to 0.028, vegetation features range from 0.01 to 0.5 and man-made features range from 0.05 to 0.4. Cloud features give range of reflectance values from 0.2 to 1. Statistical distribution for spectral reflectance was determined to calculate the mean, variance and standard deviation. These values were used to determine the minimum and maximum values of spectral reflectance for each feature. Graphs were plotted to show the interval of each features based on bands. From these graphs, there are maintain range of interval level which indicate that the measured reflectance is reliable enough for information extraction of the spectral library.
ABSTRAK

Teknologi satelit di Malaysia berkembang bagi memastikan keberadaan imej satelit untuk memenuhi keperluan pengguna remote sensing tempatan. Malangnya, satelit remote sensing tempatan telah menghasilkan imej yang berkualiti rendah. Teknik kalibrasi penggantian boleh dimanfaatkan untuk keperluan pasca kalibrasi bagi mengatasi masalah ini. Bagaimanapun terdapat kekangan menggunakan pendekatan ini dalam menentukan sasaran permukaan yang kukuh. Buat masa ini, pendekatan kalibrasi berdasarkan pantulan telah digunakan untuk pengukuran tetapi terhad dengan menggunakan beberapa tapak ujian sebagai sasaran kalibrasi. Malaysia sebagai negara persekitaran tropika sepatutnya mampu menyediakan permukaan semulajadi yang cukup stabil sebagai sasaran kalibrasi. Tujuan utama kajian ini adalah untuk membangunkan himpunan data spektral bagi ciri spatial yang terpilih. Himpunan data spektral ini akan digunakan sebagai rujukan dalam kalibrasi imej yang dijanakan oleh kamera. Jalur nampak dan jalur hampir infra-merah (NIR) dari imej Landsat 7 dan SPOT XS digunakan dalam kajian ini untuk memperolehi nilai pantulan. Nilai-nilai pantulan ini diperoleh daripada kawasan permukaan air, tumbuhan mampat, ciri buatan manusia dan litupan awan. Lengkungan pantulan untuk setiap fitur dibandingkan dengan himpunan data spektral ASTER sebagai rujukan. Perbandingan ini menunjukkan lengkungan pantulan daripada imej Landsat 7 dan SPOT XS adalah hampir sama dengan lengkungan pantulan daripada himpunan data spektral rujukan. Julat nilai pantulan dari permukaan air adalah diantara 0.018 hingga 0.028, fitur tumbuhan 0.01 hingga 0.5 dan fitur buatan manusia diantara 0.05 hingga 0.4. Fitur awan pula memberikan julat antara 0.2 hingga 1. Taburan statistik bagi pantulan spektral ditentukan untuk mendapatkan hasil nilai min, varians dan sisihan piawai. Nilai-nilai ini digunakan bagi menentukan nilai minimum dan maksimum pantulan spektral untuk setiap fitur. Selang jalur diplot di mana julat paras selang yang rendah menunjukkan nilai pantulan yang diperolehi sesuai digunakan untuk dihimpunkan sebagai pangkalan data spektral tempatan.