Introduction:

- An understanding of Mixture Toned Match Filtering (MTMF) can minimize difficulty in recognizing patterns of mixed pixels (mixels) that usually occurred in highly heterogeneous scene such as a tropical rainforest. Amongst one the recently widely used technique to decompose these mixels is MTMF, particularly reported for forestry applications (Boardman et al., 1995).
- MTMF is a spectral unmixing algorithm where measured spectral of mixed pixel is decomposed onto a collection of constituents spectra or endmembers and a set of constituents spectra or abundance that indicates the proportions of each endmember present in any given pixel (Harsanyi and Chang, 1994).
- Three parameters that contribute to mixed pixels problem: (i) low spatial resolution; (ii) feature homogeneity; and (iii) low spectral resolution. High spectral resolution is appropriate for mapping individual timber species with high precision and accuracy. This is because differentiation of individual timber species may cause some problem because trees within same genera have somewhat similar spectral characteristics. Thus, spectral detail is necessary for distinguishing similar features (William and Hunt, 2002).
- High spatial resolution also contributes to higher accuracy in automated sub-pixel classification. Low spatial resolution may result mixed pixels because tropical rainforest was heterogeneous, highly complex, with higher density of emergent and tall canopy trees (Haetel and Shimabukuro, 2005). Radiometric resolution plays important roles in sub-pixels classification. High radiometric resolution may increase ability to distinguish fine differences in reflectance values among pixels (Foody and Cox, 1994), such a case is rare in the high heterogeneity and complexity of the tropical rainforest.

Results:

- MTMF Fraction
- Infeasibility scale
- Reference data
- Fraction image with values of subpixels abundance of Chengal tree.
- Infeasibility image with value range from 1 to 12
- Reference data used for verification in 50ha experimental plot with Chengal, meranti merah and balau shown in blue, red and green respectively.
- Fraction image gives Chengal composition value for each pixel. Brighter pixels might give higher value of Chengal tree composition. Brighter fraction image might have value more than zero while darker image gives less than zero that a point to other timber genus. In brighter pixels, each of Chengal tree might cover more than one pixel due to large crown size.
- Infeasibility image (Fig. 45i) shows area that represents Chengal covers with low infeasibility value that ranging from 1 to 6. While area that been covered by other timber genera may ranging from 7 to 12. However, infeasibility should be corresponding to MTMF fraction value.

Materials and methods:

- Data Acquisition
  - ASTER Reflectance Data Product
- Data Pre-processing
  - -Reproject the Projection
- Minimum Noise Fraction
  - (MNF)
- Mixure Tuned Matched Filtering (MTMF)
- Accuracy assessment
- Derivatives Analysis
  - -First and Second order derivatives

Conclusion:

- The main goal of this study is to identify and identify Chengal trees composition within misels of satellite remotely sensed data.
- Chengal trees have been classified based on sensitive peak that been derived from second order derivative analysis while the mixture analysis is performed using MTMF. The results of this study concluded that MTMF pre-processed ASTER bands is suitable for decomposing target within mixed pixels such as Chengal trees. The regression value achieve for MTMF fraction was good (r²=0.81, p<0.005).
- Further research should focus on generation of abundance or species richness map of Chengal using various of other data sources for other respective working scales. The use hyperspectral images with higher spectral and spatial resolutions such as AVIRIS could improve the accuracy of this study.