

Identifikasi Zona Reservoir Hidrokarbon Berdasarkan Data Well Log Menggunakan Metode Data Mining Support Vector Machine: Studi Kasus Reservoir Sandstone, Formasi Mungaroo AA di Lapangan Wheatstone, Cekungan Carnarvon Utara = Identification of Hydrocarbon Reservoir Zone Based on Well Log Data Using Data Mining Support Vector Machine Method: Case Study of Sandstone Reservoir, Mungaroo AA Formation in Wheatstone Field, North Carnarvon Basin

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Abstrak

Reservoir sandstone merupakan target utama atau terpenting dalam eksplorasi hidrokarbon di Formasi Mungaroo AA daerah Offshore Cekungan Carnarvon Utara. Salah satu lapangan dengan reservoir sandstone pada Formasi Mungaroo AA berada di Lapangan Wheatstone. Identifikasi zona reservoir potensial hidrokarbon merupakan suatu hal yang fundamental dalam industri Migas. Salah satu instrumen yang saat ini menjadi sangat powerfull karena begitu luas pemanfaatannya dan nilai investasi yang besar karena tidak semahal analisa core dan well testing adalah well log. Data well log hingga saat ini masih dilakukan intepretasi secara manual atau analisa kurva. Interpretasi secara manual memakan waktu lebih lama dan melelahkan sehingga dapat mengurangi keakuratan dalam interpretasi. Seiring perkembangan waktu dibutuhkan pemanfaatan yang lebih pada data well log dibutuhkan sebuah metode yang dapat meningkatkan kualitas interpretasi atau analisis sumur, yaitu data mining.

Dalam penelitian ini, metode data mining Support Vector Machine (SVM) diterapkan untuk identifikasi zona reservoir potensial hidrokarbon dari data well log di Formasi Mungaroo AA, Lapangan Wheatstone, Cekungan Carnarvon Utara. Data well log yang digunakan berasal dari lima (5) sumur yang dibor di Lapangan yang sama. Penerapan SVM membutuhkan proses pelatihan, satu sumur digunakan sebagai data latih dan fungsi yang diperoleh darinya diterapkan pada 4 sumur yang tersisa. Fase klasifikasi akan meliputi 2 fase, yaitu fase penentuan litologi (sandstone dan non-sand) dan penentuan potensi hidrokarbon (produktif dan non-produktif). Kedua fase ini diterapkan secara bertahap menggunakan metode SVM.

Hasil penelitian didapatkan nilai rata-rata akurasi pada fase penentuan litologi (sandstone dan non-sand) menunjukkan nilai sebesar 0.98 sedangkan pada fase penentuan potensi hidrokarbon (produktif dan non-produktif) menunjukkan nilai sebesar 0.93. Hasil akhir pengujian hipotesis t dengan membandingkan distribusi nilai Net To Gross (NTG) hasil prediksi dengan NTG field report menunjukkan menunjukkan bahwa distribusi antara keduanya mendekati. Meskipun hasil pengujian hipotesa yang didapatkan mengatakan distribusi nilai NTG mendekati, peneliti merekomendasikan bahwa metode data mining dapat digunakan sebagai alat verifikasi dalam mengidentifikasi zona reservoir potensial hidrokarbon. Hal ini dapat mengurangi ketidakpastian dan meningkatkan kualitas analisis sumur.

.....Sandstone reservoir occupies the first position or dominates as a hydrocarbon resource. The sandstone reservoir is the main or most important target for hydrocarbon exploration in the Mungaroo AA Formation in the Offshore area of the North Carnarvon Basin. One of the fields with a sandstone reservoir in the Mungaroo AA Formation is the Wheatstone Field. Identification of potential hydrocarbon reservoir zones is

a fundamental matter in the oil and gas industry. One of the instruments that are currently very powerful because of its wide use and large investment value because it is not as expensive as core analysis and well testing is the well log. Well log data is still being interpreted manually or curve analysis. Manual interpretation takes longer and is tiring so it can reduce the accuracy of interpretation. Along with the development of time, more use of well log data is needed, and a method that can improve the quality of interpretation or well analysis is needed, namely data mining.

In this study, the Support Vector Machine (SVM) data mining method was applied to identify potential hydrocarbon reservoir zones from well log data in the Mungaroo AA Formation, Wheatstone Field, North Carnarvon Basin. The well log data used is from five (5) wells drilled in the same field. The application of SVM requires a training process, one well is used as training data, and the functions derived from it are applied to the remaining 4 wells. The classification phase will include 2 phases, namely the lithology determination phase (sandstone and non-sand) and the determination of the hydrocarbon potential (productive and non-productive). These two phases are implemented in stages using the SVM method.

The results showed that the average accuracy value in the lithology determination phase showed a value of 0.98 while the hydrocarbon potential determination phase showed a value of 0.93. The result of testing the hypothesis by comparing the distribution of the predicted NTG value with the NTG field report shows that the distribution between the two is identical. Although the results of the hypothesis testing obtained say the distribution of NTG values is identical, the researcher recommends that the data mining method can be used as a verification tool in identifying potential hydrocarbon reservoir zones. This can reduce uncertainty and improve the quality of well analysis.