5.1 LEVERAGING GENERATIVE ADVERSARIAL NETWORKS (GANS) TO ENHANCE WELL LOGGING DATA INTERPRETATION FOR SUSTAINABLE NEAR-FIELD EXPLORATION

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ABSTRACT

This study focuses on the utilization of Generative Adversarial Networks (GANs) to improve the interpretation of well logging data, a critical element in near-field exploration within the oil and gas industry. Limited data accessibility and confidentiality constraints have historically posed challenges to the accuracy and efficiency of well logging data interpretation, significantly impacting exploration outcomes and environmental stewardship.Our research presents an innovative approach where GANs, a machine learning model capable of generating synthetic data indistinguishable from real data, are employed to enhance well logging data interpretation. We have trained a GAN model using a dataset of actual well logs to produce synthetic well logs. These synthetic logs are seamlessly integrated into the well logging data interpretation workflow alongside authentic well logs.The outcomes of this study reveal that the incorporation of synthetic well logs generated by GANs leads to a substantial improvement in the well logging data interpretation process for near-field exploration. The augmentation of the dataset with synthetic logs provides a more comprehensive understanding of reservoir properties and geological heterogeneities, enhancing reservoir characterization and supporting more accurate decision-making processes.This novel approach holds significant promise for sustainable near-field exploration. By leveraging GANs to generate synthetic well logs from limited data sources, operators can gain deeper insights into their near-field reservoirs, ultimately leading to more informed decisions regarding exploration strategies and environmental practices. This innovation has the potential to reduce drilling costs, enhance exploration success rates, and minimize environmental impacts.

KEYWORDS: Well logging, Generative Adversarial Networks (GANs), near-field exploration, reservoir characterization, sustainable practices, data interpretation