Sen-forge

Image Forgery

TEAM SENTINELS

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Objectives of the project

Objectives

Our goal is to develop a machine learning model that not only detects and classifies image forgeries but also precisely localizes and highlights the manipulated regions. This model should handle various manipulation techniques such as splicing, copy-move, removal, and enhancement, and be robust enough to work across different image formats and resolutions

Resources

GitHub

Kaggle

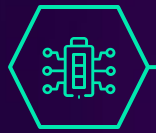
Papers with Code

Solution

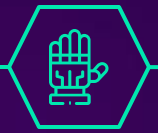
- ManTraNet is a unified deep neural network architecture designed to detect and localize image forgeries in an end-to-end manner, without the need for extra preprocessing or postprocessing steps. It handles images of any size and detects various types of manipulations, such as splicing, copy-move, removal, enhancement, and even unknown manipulations.

•**Self-Supervised Learning**: ManTraNet learns robust image manipulation traces by classifying 385 different manipulation types.
•**Forgery Localization as Anomaly Detection**: It formulates forgery localization as a local anomaly detection problem, introducing a Z-score feature to detect manipulation traces.
•**LSTM for Anomaly Assessment**: A Long Short-Term Memory (LSTM) network is employed to assess local anomalies, helping to accurately identify tampered regions.
•**Ablation Studies**: Extensive experiments were conducted to optimize the network's design, demonstrating its effectiveness in handling both simple and complex forgeries.

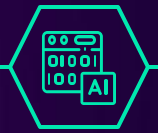
Process Timeline



Data Acquisition



Injecting pre trained rates into the model

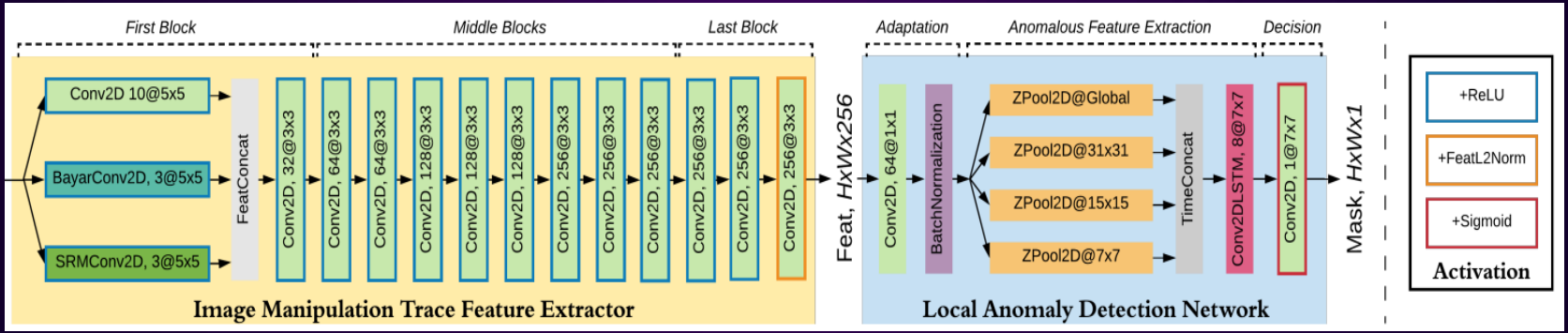


Taking image as input

Model detects the forgery and creates a mask of forged region

Provide customer support to ensure customer satisfaction

Model Workflow



Conclusion

- ManTraNet presents a powerful and unified solution for detecting and localizing image forgeries. By leveraging self-supervised learning to identify manipulation traces across hundreds of manipulation types and framing forgery localization as an anomaly detection problem, it effectively addresses both simple and complex image manipulations. The use of an LSTM-based approach for assessing local anomalies further enhances its ability to accurately detect tampered regions. Extensive experimental results demonstrate ManTraNet's robustness, generalizability, and superiority over existing methods, making it highly effective in combating real-life image forgeries involving multiple or unknown manipulations

Team Members

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