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Radio Galaxy detection prediction with ensemble Machine Learning

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Simulations tell us that a large number of AGN should be detected in the radio at high z[1]. But only a few hundreds have been detected[2]. No clear reason for this mismatch[3].

Current and future radio facilities (e.g. ASKAP, MeerKAT, SKA, w/our team's involvement) will deliver huge data volumes that would take too much time to be analysed with usual techniques.

How to predict the presence of radio-detected AGN without radio measurements?

Machine Learning!
Using a series of models to predict:
- -AGN detection
- -**Radio detection of AGN** (above flux limit)
- -Redshift of radio-detected AGN

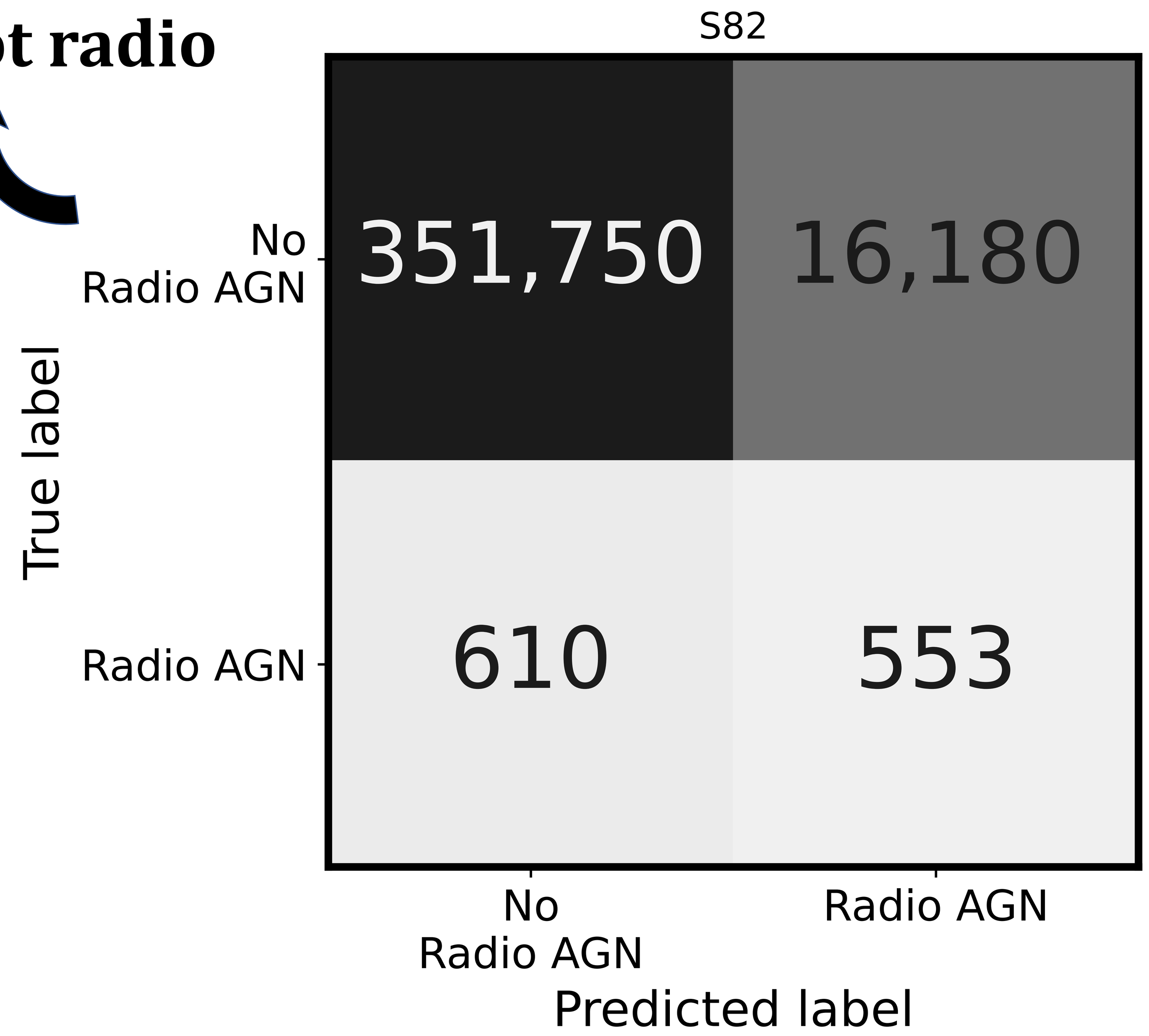
For training the models, we used photometry (UV, Optical, NIR) in the HETDEX Spring Field (~6M objects)[4]. Each model used stacking (predictions of base models as extra features). We have previously tested this strategy in redshift predictions[5].

In the Stripe 82 Field (~370k objects)[6], **84%** of the previously detected AGN and, from them, **64%** of known radio detections are **recovered by our pipeline**. And their redshift **prediction deviation is** $\sigma_{NMAD} = 0.091$.

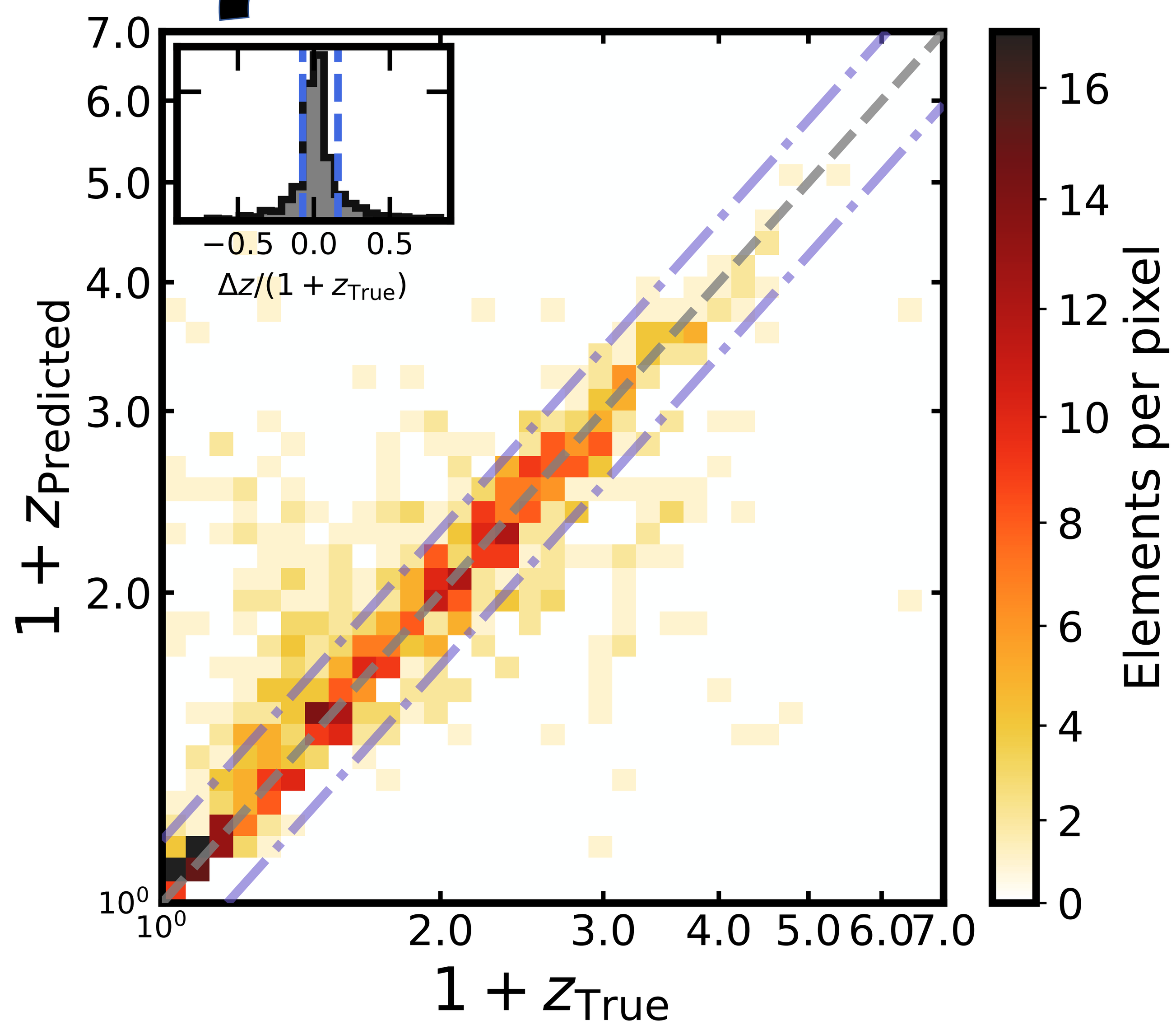
We are able to create a catalogue of new predicted RGs along with their z values. These sources could be tested with future radio observations increasing, potentially, the rate of new discoveries.

Not AGN or not radio

New RGs?



Prediction dispersion



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