Stock movement prediction is typically addressed as a supervised classification task where historical prices are the key input features.

Standard supervised learning methods could suffer from weak generalization due to learning from static prices and ignoring their highly stochasticity.

We propose to learn stock prediction models with adversarial training to account for the stochastic property of stock market, which enhances the model to be robust to small perturbations.

### Framework

**Prediction layer**

**Temporal attention layer**

**LSTM layer**

**Feature mapping layer**

(a) Attentive-LSTM (building block)

(b) Adversarial Attentive-LSTM

### Experiments

- **Datasets:** ACL18 (88 stocks), KDD17 (50 stocks).

<table>
<thead>
<tr>
<th>Methods</th>
<th>Acc</th>
<th>RI</th>
<th>MCC</th>
<th>RI</th>
</tr>
</thead>
<tbody>
<tr>
<td>RAND</td>
<td>50.89±4e-1</td>
<td>5.70%</td>
<td>0.0038±8e-3</td>
<td>1276.32%</td>
</tr>
<tr>
<td>LSTM</td>
<td>51.62±4e-1</td>
<td>2.77%</td>
<td>0.0183±6e-3</td>
<td>185.79%</td>
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<tr>
<td>ALSTM</td>
<td>51.94±7e-1</td>
<td>2.14%</td>
<td>0.0261±1e-2</td>
<td>100.38%</td>
</tr>
<tr>
<td>StockNet</td>
<td>51.93±4e-1</td>
<td>2.14%</td>
<td>0.0335±5e-3</td>
<td>56.12%</td>
</tr>
<tr>
<td>Adv-ALSTM</td>
<td>53.05±4e-1</td>
<td>—</td>
<td>0.0823± —</td>
<td>—</td>
</tr>
</tbody>
</table>

- **Random perturbations VS Adversarial perturbations**

Rand-ALSTM: add random pert. to clean examples.

Adv-ALSTM: add adversarial pert. to clean examples.

- **Impacts of adversarial training**

(a) Distributions of classification confidences from ALSTM and Adv-ALSTM for clean examples in val. and testing.

(b) Robustness against adv. examples of ALSTM and Adv-ALSTM. The plotted numbers are the relative performance decrease (w.r.t. Acc and MCC) of trained models on adv. examples compared to clean ones.