ALVINN:
Autonomous Land Vehicel in a Neural Network

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Introduction

- Navigation is slow!

- Noise and unpredicatability presents problems

- Neural Nets are noise insensitive and can be trained to preform well under a variety of senarios

Architecture

- Single hidden layer back-propagation network
- Three sets of units
  - 30x32 unit video camera
 - 8x32 unit laser range finder
  - One intesity feedback unit

Architecture

- Output layer
  - First 45 units describe curviture
    - All zeroes except for one hill
  - Last ouput unit is another feedback unit

Training

- Neural Nets need training material to work

- Generate 1200 images that are indistinguishable from real pictures do to low res

- Feedback unit has random activation

- After 40 epochs, the neural net has 90% accuracy

Intermission
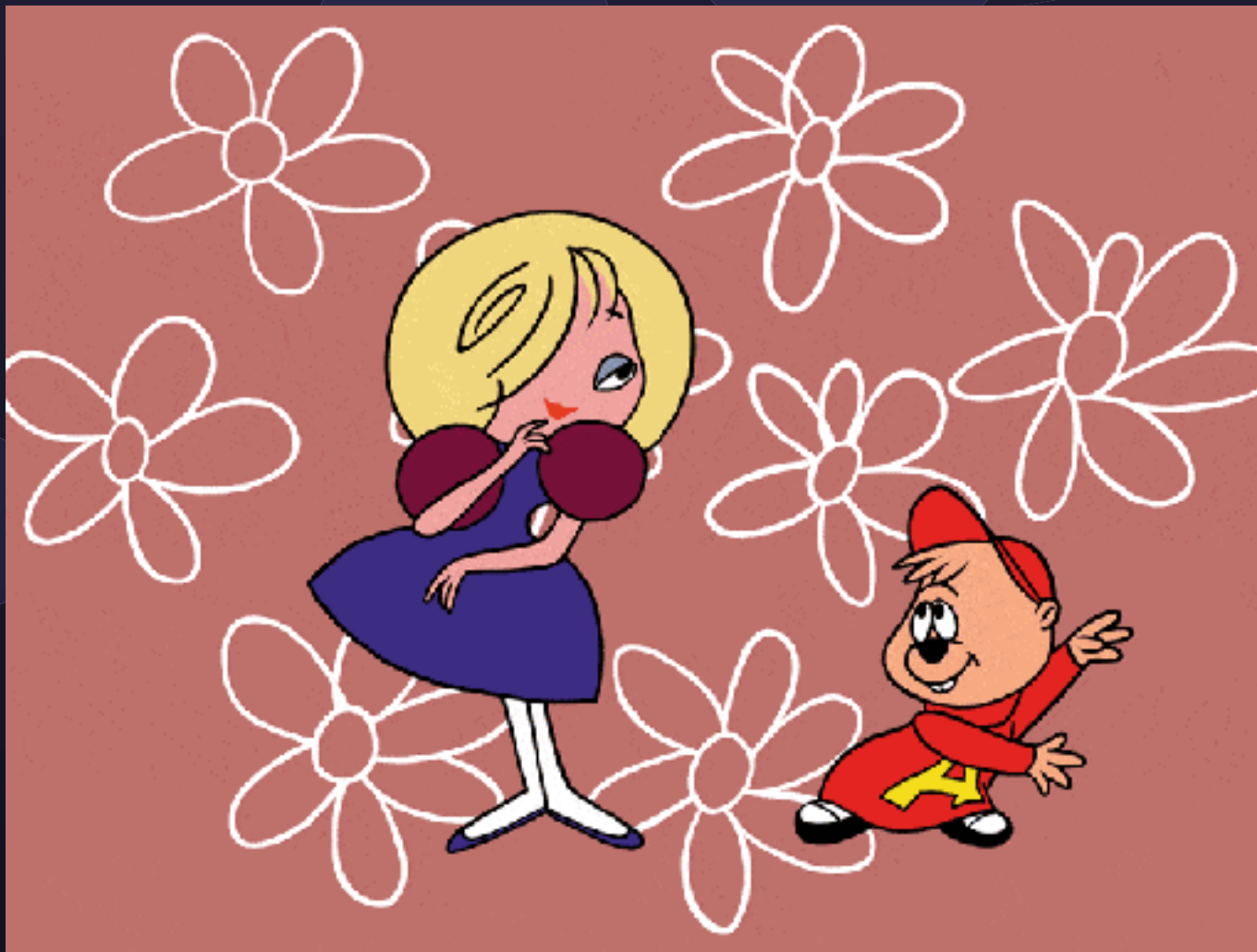
Conclusions

- Neural Networks get results fast; a half hour vs. months

- Past systems were inflexible, this can be trained to a multitude of conditions

- Weights are automatically discovered in training

Future Work

- Test under more lighting and weather conditions
- Exploit new networds
  - Additional feedback through recirculating hidden activation levels
  - Adding a second layer
  - Adding local connectivity to give a priori knowlege of input

Future Work

- Add Extensions to stop or aviod obstacles
- Dealing sensibly with forks and intersections
- Intergrate map for global planning

Conclusion