Big Data Analytics

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Outline

1. GraphLab Application Deployment

2. Relational Classification Example

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Steps

1. Install GraphLab into a specific directory
   - Example: `/home/user/graphlab`
2. Create a directory for your application under `/home/user/graphlab/apps`
3. Create a CMakeLists.txt file into your application directory
4. Add the source files for your program under your application directory
5. Run `./configure` under `/home/user/graphlab`
6. Go to `/home/user/graphlab/release/apps/your_application` and type `make`

CMakeLists.txt

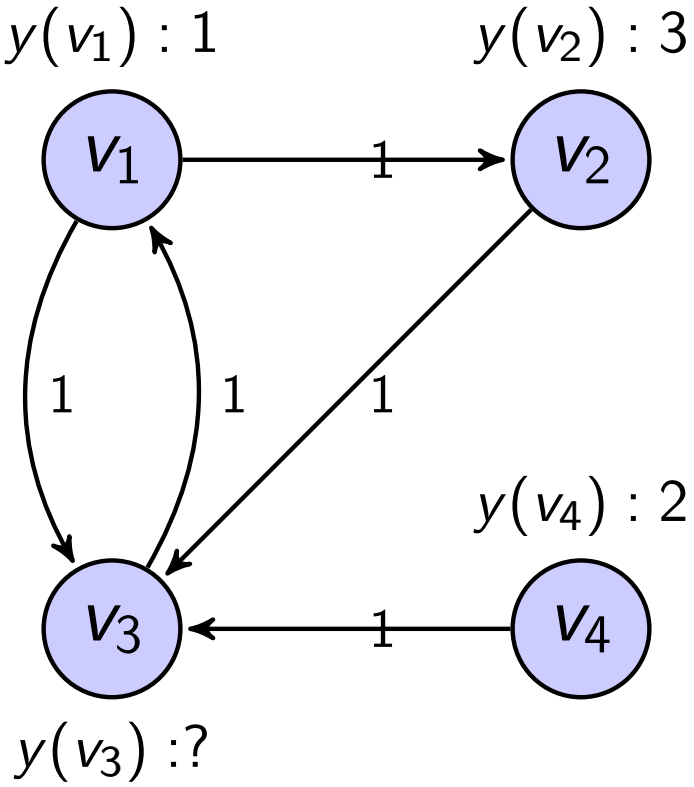
```
project(MyProjectName)

add_graphlab_executable(executable_name implementation.cpp)
```

Hello World

```
#include <graphlab.hpp>

int main(int argc, char** argv) {

  graphlab::mpi_tools::init(argc, argv);
  graphlab::distributed_control dc;

  dc.cout() << "Hello World!\n";

  graphlab::mpi_tools::finalize();

}
```

Outline

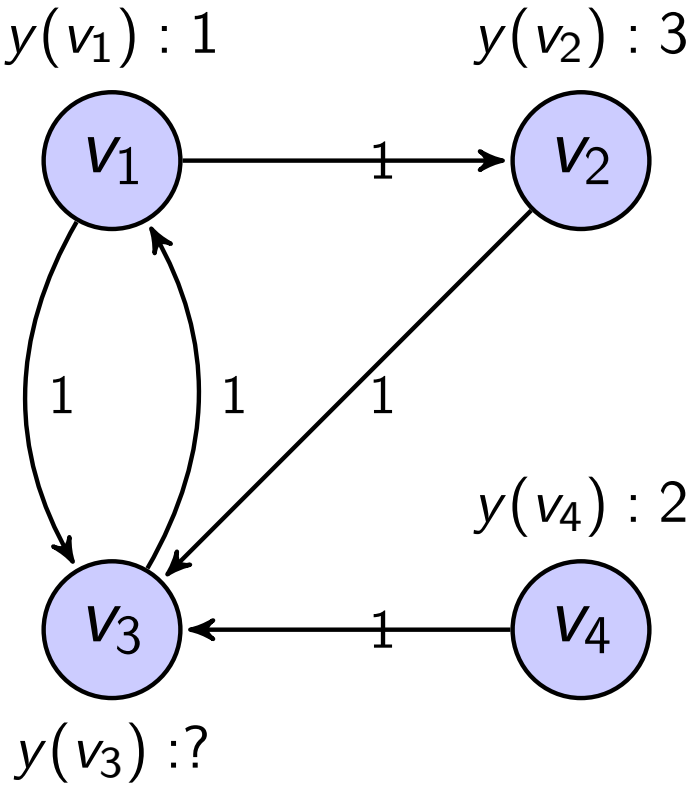
Relational Classification



Given a graph $G := (V, E)$ and a set of labels L

- Some nodes have labels $y : V \rightarrow L$
- Edges v, u have weights $w_{v,u}$
- Task: estimate a function $\hat{y} : V \rightarrow L$

Weighted voted Relational Neighbor



Probability that a vertex $v \in V$ has label $c \in L$

$$P(c|v) = \frac{1}{Z_v} \sum_{u \in \{u | u \in \mathcal{N}_v \wedge y(u) = c\}} w_{(u,v)}$$

Where:

$$Z_v = \sum_{u \in \mathcal{N}_v} w_{(u,v)}$$

- $\mathcal{N}_v$ denotes the neighbors of v

$$\hat{y}(v) := \arg\max_{c \in L} P(c|v)$$

wvRN Vertex Program:

1: **procedure** wvRNGather
input: vertex v, scope $\mathcal{S}_v$, ingoing edge $(u \rightarrow v)$

2: **return** $(w_{(u,v)}, y(u))$

3: **end procedure**

1: **procedure** wvRNApply
input: vertex v, scope $\mathcal{S}_v$, gather result $(Z_v, \left(\sum_{\{u|u \in \mathcal{N}_v \wedge y(u)=c\}} w_{u,v}\right)_{c \in L})$,

2: $\hat{y}(v) := \arg\max_{c \in L} \left(\sum_{\{u|u \in \mathcal{N}_v \wedge y(u)=c\}} w_{u,v}\right)$

3: **end procedure**

wvRN Code

- Code and toy data:
  - `http://www.ismll.uni-hildesheim.de/lehre/bd-14s/script/gl_ex/wvRN_example.zip`